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THE RESISTANCE OF MOSQUITOES TO INSECTICIDES

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One of the most striking cases of resistance to an insecticide is that of the housefly (*Musca domestica*). This resistance has occurred in a number of widely separated areas, after intensive DDT spraying primarily directed against malaria-carrying mosquitoes. Since houseflies and mosquitoes have been subjected to the same treatment in many areas (e.g., Sardinia, Italy, etc.) it might be wondered why resistance to DDT did not occur simultaneously and on the same scale in the two insects. There are, in fact, few reports of mosquitoes becoming resistant to DDT, and an examination of the literature shows that no malaria-carrying mosquitoes have, as yet, become markedly resistant to any insecticide.

Anopheline mosquitoes and DDT resistance

GAHAN, DOWNS and CELIS (1949) report that after annual treatments with DDT each spring for 4 years, *Anopheles pseudopunctipennis* in the region of Temixco, Mexico, had not become resistant. LUDVIK, SNOW and HAWKINS (1951) collected *Anopheles quadrimaculatus* from the Tennessee valley from (a) an untreated area, and (b) an area which had received regular treatment for 5 years with DDT. Although the mortalities on exposure to DDT of both larval and adult mosquitoes collected from the untreated zone were slightly higher than those from the treated zone, in only one case was the difference statistically significant. All the differences were slight, and they were considered to be of no practical importance.

An attempt to select in the laboratory a strain of *Anopheles quadrimaculatus* resistant to DDT has failed (FAY *et al.*, 1949). The insects were exposed in 4 consecutive generations to a dose of DDT which killed approximately 66 per cent. The fifth generation was allowed to breed without being exposed to DDT, and each generation, including the sixth, was tested for DDT resistance. Mosquitoes of the second generation showed a statistically significant drop in kill, which was maintained but not increased up to the fifth generation. The sixth generation (*i.e.*, after one generation without selection), however, reverted to the original level of susceptibility. The resistance shown in this case clearly does not compare with the resistance shown by houseflies to DDT, and appears to be of a different nature since reversion back to the non-resistant state occurs in one generation.

The campaign against vectors of malaria in Sardinia, which involved the use of DDT both as a larvicide and as a residual spray, has been in progress for 4 years. TRAPIDO (1951) investigated the resistance of Sardinian mosquitoes to DDT by testing them in the laboratory. *Anopheles claviger* was the test species, since it was impossible to find enough larvae of the malaria vector *Anopheles maculipennis labranchiae*. The mortality obtained with larvae of *Anopheles claviger* in DDT acetone-water suspensions was compared with that of larvae of the same species taken from untreated areas on the mainland of Italy. There was no significant difference in kill between larvae from the two different sources.

Cases of DDT resistance in Culicine mosquitoes

Although there are no clear cases of Anopheline mosquitoes being resistant to DDT, there are instances of resistance among Culicine mosquitoes. The first report of a DDT-resistant mosquito came from Latina, Italy, where MOSNA (1947) found that wild-caught adults of *Culex pipiens autogenicus* could withstand exposure to the insecticide for longer periods than a laboratory strain. When tested in the laboratory insects of the resistant race were killed only by exposure for 32-48 hours, whereas an exposure of 3-5 hours to the same dose of DDT killed all those of the laboratory strain. VEROLINI (1948) found that although the adults of *Culex pipiens* from Latina were DDT-resistant, the larvae showed a high mortality with DDT. Since no normal larvae were used for comparison, however, and the dose of DDT was high, it is difficult to assess the value of this result.

The most striking evidence of resistance occurring in mosquitoes comes from Brevard County, Florida, where the prevalent mosquitoes *Aedes taeniorhynchus* and *Aedes sollicitans* showed a considerable resistance to DDT after 5 years of spraying (DEONIER and GILBERT, 1950; DEONIER, CAIN and McDUFFIE, 1950). Fourth instar larvae collected from treated areas were considerably more resistant to acetone-water suspensions of DDT than larvae taken from untreated areas (see table I). There are insufficient data, however, to compare the LD50 of larvae from treated and untreated areas. Adult *Aedes taeniorhynchus*, too, were more resistant to DDT when collected from treated areas. Similarly, in Dade County, Florida, DDT controlled salt-marsh mosquitoes adequately for 4 years, but in 1950 there was a very noticeable increase in numbers of mosquitoes (Dade County, Ann. Rept. 1950).

TABLE I.

| Date | Location | Percentage mortality of <i>Aedes taeniorhynchus</i> 48 hours after the application of DDT | | | |
|----------|----------|---|-------|------|-------|
| | | Concentrations of DDT in parts per million | | | |
| | | 0.05 | 0.025 | 0.01 | 0.005 |
| Aug. 26 | ... | 100 | 76 | 44 | 16 |
| Sept. 1 | ... | 0 | 0 | 0 | 0 |
| Sept. 15 | ... | 16 | 12 | 4 | 0 |
| Aug. 26 | ... | 100 | 100 | 100 | 100 |
| Sept. 1 | ... | 100 | 98 | 96 | 38 |
| Sept. 15 | ... | 100 | 100 | 58 | 22 |

BOHART and MURRAY (1950) compared fourth instar larvae of *Aedes nigromaculus* which had been collected from DDT treated and untreated irrigated pastures in California. The dose required to give a 50 per cent. kill of larvae from treated areas was approximately 3 times that required to kill 50 per cent. of larvae from untreated areas (see table II).

TABLE II.

| Concentration of DDT in parts per million | Percentage kill of larvae after exposure for 24 hours to DDT | |
|--|---|-----------------------------|
| | Larvae from untreated area | Larvae from treated area |
| 1 : 1 million | 100 | 100 |
| 1 : 10 " | 100 | 66.7 |
| 1 : 30 " | 100 | 26.7 |
| 1 : 50 " | 79.4 | 20.0 |
| 1 : 100 " | 66.7 | 5.9 |
| 1 : 200 " | 52.7 | 5.0 |
| 1 : 400 " | 25.6 | 1.7 |
| None | 13.3 | 0 |

The resistance of mosquitoes to other insecticides

DDT-resistant mosquitoes (*Aedes taeniorhynchus*, and *Aedes sollicitans*) were tested in the laboratory by DEONIER and GILBERT (1950) for resistance to insecticides other than DDT. Both larvae and adults of these mosquitoes were resistant to DDD, but larvae were not resistant to toxaphene, dieldrin, lindane, chlordane or parathion. On the other hand adult *Aedes taeniorhynchus* from treated areas were very slightly resistant to toxaphene, lindane, technical BHC and chlordane. DEONIER, CAIN and McDUFFIE (1950) carried out aerial spray tests in that part of Florida where DDT-resistant *Aedes taeniorhynchus* and *Aedes sollicitans* occur, and proved that in the field lindane was a most effective insecticide against both species. Other insecticides which gave effective control were technical BHC, dieldrin and parathion. Chlordane was ineffective at low dosages (0.3 lb./acre) but gave good control when used at the rate of 0.6 lb./acre. BOHART and MURRAY (1950) found that larvae of DDT-resistant *Aedes nigromaculus* were not resistant to toxaphene. MOSNA (1948) exposed DDT-resistant *Culex pipiens autogenicus* to glass surfaces treated with 0.1 mgm./sq. cm. of chlordane, which gave 100 per cent. kill in 40-90 minutes. Similarly surfaces treated with Gammexane (0.1 mgm./sq. cm.) killed all insects within 10-15 minutes for the first month after treatment of the surface.

Discussion

Two important points emerge from this survey of the literature. In the first place, there is no clear case of any *Anopheline* mosquito becoming DDT-resistant. In view of the intensive spraying with DDT in anti-malarial campaigns in areas as wide apart as Sardinia, Cyprus and parts of the U.S.A. and West Africa, this is surprising. Moreover, DDT has been used in these areas over a period of several years. Secondly, among *Culicine* mosquitoes, there are clear cases of DDT-resistance comparable with that of houseflies. It is apparent from the data that resistance in *Culicines* was noticed after DDT had been used for 4-5 years.

This difference between Anopheline and Culicine mosquitoes may perhaps mean that Anopheline mosquitoes do not possess the necessary factors for resistance to develop, or alternatively that resistance takes longer to occur in Anophelines than in Culicines. Unfortunately there is no evidence for, or against, either of these points, but the latter possibility should not be overlooked.

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SUMMARY OF RECENT ABSTRACTS*

IV. TRYPANOSOMIASIS

AFRICAN TRYPANOSOMIASIS

General : Aetiology

The Report of the Conference of the International Committee of Trypanosomiasis Research held at Antwerp in 1950 is summarized on p. 338.

The Trypanosomiasis Commission of Moçambique (p. 339) has issued its Report for 1948. A map of tsetse distribution in the Colony was prepared, and a sleeping sickness survey was continued; incidence is not high. Dissections were made of the various species of *Glossina*. The control of animal trypanosomiasis is discussed. A later report (p. 791) confirms the great importance of *G. austeni* as a host of pathogenic trypanosomes.

Incidence of trypanosomiasis is high in Portuguese Guinea, where FERREIRA (p. 340) reports on work done in 1949. The common tsetse is *G. palpalis*.

KLEINSCHMIDT (p. 1090) reports a study of the finer structure of trypanosomes by light microscopy and electron microscopy.

HAWKING and THURSTON (p. 1088) record an incomplete experiment which shows that metacyclic *T. rhodesiense* remain in the blood of mice after inoculation, for at least one hour. The object was to see if, like malaria parasites, they leave the blood in the incubation period.

ROUBAUD and PROVOST (p. 1087) give an account of a strain of *T. gambiense* from Yaoundé, which they regard as a distinct sub-species. It produces encephalomyelitis and paralysis in laboratory rodents.

An investigation of the influence of some sulphhydryl inhibitors and of fluoroacetate on the oxygen consumption of certain trypanosomes is reported by VON BRAND *et al.* (p. 530).

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1951, v. 48. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

Neither cortisone nor ACTH has any influence on trypanosomes *in vitro* or *in vivo*, or on the survival of infected rats (VON BRAND *et al.*, p. 964).

Transmission

The Annual Report for 1950 of the East African Tsetse and Trypanosomiasis Research and Reclamation Organization (p. 951) is reviewed at length. The review should be read in full, and the original should be consulted for details. In the last few years tsetse research has become more practical in that it is now related to trypanosomiasis and to practical problems of development of East Africa. In his review Buxton comments on this change in objective from that of free research. Special mention is made of JACKSON's method for estimating tsetse populations per square mile as distinct from numbers of flies caught per hour or per mile. Calculations can be made which convert ordinary fly-round figures to figures per square mile, and this is important because in this way much of the old work can be related to the new.

A series of drawings of larvae of *G. swynnertoni* has been issued by BURTT and JACKSON (p. 530).

A record of two advances of *G. morsitans* in Tanganyika, which have been observed during a long period of years, has been published by JACKSON (p. 133), who shows that this is not a phenomenon of ebb and flow, but rather of continuous advance into an area which the insect had not occupied previously for a very long period. The cause is not known.

In the coastal area of Kenya *G. pallidipes* is evenly dispersed through all types of vegetation, but is absent from cultivated areas. MOGGRIDGE (p. 134) discusses this and the distribution of other tsetse, and their biting habits.

LEWIS (p. 24) discusses the distribution of the 7 species of *Glossina* found in the Sudan. He notes that *T. congolense* infection occurs in parts of the country free from tsetse. The spread of human trypanosomiasis has been checked by intense effort under difficult conditions, to an average of 66 known cases per annum, but there is now need for an inexpensive but effective form of local control.

In the Report of the British African Land Utilization Conference, held in Nigeria in 1949 (p. 718) there is a section dealing with trypanosomiasis and tsetse flies. This should be read in full.

RAGEAU (p. 1088) gives a short account of the tsetse flies of the French Cameroons and the types of vegetation they prefer. Records of *Glossina* in French Equatorial Africa are given by MAILLOT (p. 133), with rates of infection by *T. gambiense*. He (p. 238) discusses seasonal movements of *G. palpalis* in the neighbourhood of Brazzaville; the specimens taken belonged to a peculiar form which will require further study.

Pathology : Clinical Findings

VAN OYE and PEEL (p. 792) discuss the nature and origin of the morula cells of Mott in trypanosomiasis.

The blood picture of West African trypanosomiasis shows slight normochromic, microcytic anaemia, moderate leucocytosis with increase of monocytes and lymphocytes, and neutropenia. Details are given by TRINCÃO and DE GOUVEIA (pp. 239, 792).

Certain serum reactions (MacLagan and others) which tend to be positive in untreated trypanosomiasis, tend to become normal under treatment (MONNET and BAYLET, p. 621).

In examination of African patients in Fernando Po ZSCHUCKE (p. 239) found the sugar content of blood, but not of cerebrospinal fluid, lower in infected than in normal persons, especially in the early stage. The use of sugar by *T. gambiense* has no special importance in sleeping sickness. There is a

serious disturbance of vitamin metabolism, especially vitamin C balance in the late stage.

In an important paper NEUJEAN (p. 956) differentiates spinal and cephalic fluids. The technique is to draw 20 cc. by the lumbar route, then to insufflate 40 cc. of air, and then to draw 20 cc. again. The first few cc. of the first specimen are spinal, the last few cc. of the second are from the cerebral and ventricular spaces. The cell counts in the latter are slightly higher than those in the former in normal persons, and the albumin content is usually lower. He has studied the effect of treatment with various drugs on these fluids, and he notes that in cases of beginning relapse the cephalic fluid first shows increased cell count; a normal spinal fluid may be associated with an abnormal cephalic fluid, and this may be the explanation of failures in treatment with suramin or pentamidine of patients thought to be in the lymphatico-blood stage. It is therefore dangerous to use only these drugs if the cerebrospinal fluid examined has been obtained by the customary technique.

SAUNDERS (p. 238) has written a full account of trypanosomiasis due to *T. gambiense*.

Treatment

CECCALDI (p. 529) reports on the trypanosomiasis work of the Pasteur Institute, Brazzaville, during 1948 and 1949. Of 109 new cases, treatment failed to check further development of the disease in 36 per cent., and there is evidently room for improvement. Details are given of the drugs and courses used, which include drugs of the Friedheim series, the diamidines, and tryparsamide.

ROLLO and WILLIAMSON (p. 955) discuss resistance of trypanosomes to Melarsen and pentamidine, which contain groupings of the amidine type, and to tryparsamide, which does not. If the trypanosome has had experience of an arsenical without amidine, it remains susceptible to compounds having the amidine moiety, even if they contain arsenic (like Melarsen), but if it has had experience of both the arsenical and the amidine feature, it becomes resistant to both.

DUGGAN and HUTCHINSON (p. 957) have compared certain drugs in human *T. gambiense* infection. Although Melarsen, Melarsen oxide and Mel B are effective in the doses used, they are all more toxic than tryparsamide and Mapharsen, and Melarsen oxide and Mel B are unsuitable for use on a large scale in unselected subjects. Pentamidine is as useful as tryparsamide in intermediate cases, and is non-toxic; the two may be given together, and in these intermediate cases they give better results than antrypol and tryparsamide.

The mode of action of the diamidines and the arsenicals and antimonials in trypanosomiasis is discussed by PILLE (p. 621), who pays special attention to the compounds of BAL with arsenicals. The action of arsenicals is on the thiol groups of the parasites, but the BAL component does not short-circuit this action, though such an effect might have been expected. The mode of action of Mel B is incompletely understood.

FERREIRA *et al.* (p. 341) report encouraging results from the use of Mel B in patients even in the late stage of *T. gambiense* infection. The drug was given in one or two courses of 3.6 mgm. per kgm., each lasting 4 consecutive days. There was some toxic effect in one quarter of the patients.

Urinary excretion of Mel B is rapid, and is practically over in 96 hours after the end of a course of treatment, though some arsenic is retained. MONNET and BAYLET (p. 958), therefore, argue that the rapid excretion seems to justify frequent injections in a short course, and that the retention of arsenic is a warning against a long course.

A method for estimation of Melarsen and Mel B in blood and urine is described by MONNET (p. 531).

PETERS and WRIGHT (p. 964) discuss the loss of *in vitro* trypanocidal action of Mapharside in blood withdrawn from rats given the drug intravenously. This loss is more rapid than loss in arsenic content, and the authors examine the possible causes of this phenomenon.

LAPEYSSONNIE (p. 959) reviews some of the work on Eagle's compound "70A" in *T. gambiense* infections; it has not been particularly successful when used alone, but when it was given with tryparsamide in advanced cases the results were such as to lead the author to wonder whether any other treatment would be better and less toxic.

Some degree of activity in experimental trypanosomiasis was exhibited by certain lactones or their analogues tested by GIARMAN (p. 1091).

Drug Prophylaxis

In Moçambique there is an endemic area of human trypanosomiasis, with a rate of new cases amounting to 0.51 per 1,000 in 1949. For chemoprophylaxis two injections of antypol (0.5 and 1.5 gm. two days later) are given, or 3 doses of 5 mgm. per kgm. pentamidine isethionate, at intervals of several months. Results are to be reported later (Trypanosomiasis Commission of Moçambique, p. 791).

LAUNOY (p. 342) has investigated the prophylactic capacity of lomidine against *T. gambiense* in rats. The prophylactic dose to give protection for 5-6 months is about one-third of the LD50. In comment Lourie criticizes his practice of re-inoculating the same rat several times, in that this may create a complication through immunity. JONCHÈRE (p. 717) writes favourably of chemoprophylaxis with lomidine, the standard dose of which is 4 mgm. of base per kgm., given intramuscularly. In French West Africa over 300,000 people have been given this, and in one part the index of new infection fell from 0.97 to 0.06 per cent. in the treated, and to 0.45 even in the untreated. The author estimates that the duration of protection is about 1 year, but Lourie thinks this an overestimate. A similar favourable report from the same area comes from DIALLO (p. 718), who thinks that if two injections were given with an interval of 9 months, the disease might be practically eliminated.

In French Equatorial Africa mass treatment and measures against tsetse flies have been used for over 40 years. RAYNAL (p. 951) shows that the rate of new cases per 1,000 examined has fallen from 13-14 in 1924-26 to 2.5-5 in 1944-46. In 1946 mass chemoprophylaxis was introduced and has since been greatly extended with highly encouraging results. In the same country where chemoprophylactic campaigns with the diamidines have been carried out at intervals of 6 months, for several years, KERNEVEZ and CHASSAIN (p. 959) give figures of parasite indices which indicate very great reductions in the large treated populations. In comment, however, Lourie remarks that rates as high as 1.3 and 0.5, recorded after 3 and 5 treatments in two areas, cannot be regarded as good, and need explanation. RAYNAL and LOTTE (p. 960) have also written an account of these campaigns.

FERREIRA *et al.* (341) claim that a single dose of pentamidine, 4 mgm. per kgm., protects against *T. gambiense*, in one district of Portuguese Guinea, for at least 8 months. They base their opinion on a fairly large group observed against a control group.

SCAILLET and HADDAD (p. 961) report on chemoprophylaxis with pentamidine in the Belgian Congo, where, in some areas, three injections have been given at

intervals of 6 months. The results are regarded as very good, but mention is made of cryptic infections without demonstrable trypanosomes, diagnosed clinically in some of the treated persons.

Control

LEWIS (p. 449) summarizes the results achieved in control of trypanosomiasis by destruction of wild game, the main object of which is to reclaim land for African settlement. In several parts of Africa it has been shown that destruction of game is followed by disappearance of *G. morsitans*, and in one area by reduction or disappearance of certain other species. An unfavourable account is given by GLOVER (p. 450) of attempts to control *G. pallidipes* in part of Zululand by shooting wild game. The area covered 400–500 square miles, and 138,339 animals were shot in two campaigns, 1929–30 and 1942–50. The density of tsetse decreased until 1938, but rose steadily from 1941 to 1947, when an attack was made by insecticides sprayed from aircraft. After the shooting ceased, game soon returned to the area.

In a test of hessian traps impregnated with DDT in the Gold Coast MORRIS (p. 135) found that after early reduction of efficiency, probably because the toxic effect of kerosene quickly wore off, the hessian remained insecticidal at a constant level for 20–30 weeks, except that it was more lethal in the hot dry season than in cooler and moister weather, a phenomenon which the author discusses. This finding does not agree with some previous work in Uganda, which indicated that hessian needs re-impregnation each week. It seems that impregnation of such animal traps is an improvement in control which would be particularly useful near much-frequented sources of water.

PIRES (p. 955) found a relationship in Portuguese East Africa between the hippopotamus and *G. brevipalpis*, and by driving out the former apparently caused a great reduction in these flies. Cattle were dipped in a mixture containing DDT and BHC, to kill flies.

In one of his last papers KLEINE (p. 134) surveyed generally the problems of African trypanosomiasis and their control.

Trypanosomiasis of Animals

A study of 4 species of *Glossina*, and of their infections with *T. vivax* and *T. congolense*, is recorded by PIRES *et al.* (p. 448) from Portuguese East Africa. *G. austeni* and *G. morsitans* were of greatest veterinary importance, but *G. pallidipes* and *G. brevipalpis* were also infected.

FIENNES (p. 343) distinguishes two stages in *T. congolense* infection of cattle—primary and secondary. In the latter the trypanosomes disappear from the blood, but the disease, though cryptic, is still present and may be severe. He discusses these stages, and states that the presence of antibody, as shown by mouse-protection tests, is a sure indication of cryptic infection. In this stage there is no known curative treatment, but spontaneous recovery is frequent. He suggests that the apparent protection by drugs given in prophylactic doses depends not on the direct action of the drugs but on the creation of a focus of premunition.

The action of antrycide and dimidium in trypanosomiasis of cattle has been studied by GOODWIN and WALLS (p. 345) and by FIENNES (p. 963). ROUBAUD and BOURDIÉ (p. 344) refer to the possibility that the use of antrycide may lead to cryptic infections. ORMEROD (pp. 961, 962) discusses its mode of action, and SPINKS (p. 345) its absorption and persistence. LOCK (p. 344) has studied the *in vitro* activity of certain phenanthridinium compounds.

The electron microscope appearances of *T. lewisi* are reported by KLEINSCHMIDT and KINDER (p. 622).

AMERICAN TRYPANOSOMIASIS

CHAGAS'S DISEASE

Epidemiology : Transmission

Chagas's disease is reported from Ecuador for the first time by JERVIS and MONTALVAN C. (p. 346) ; MONTALVAN C. (p. 1091) subsequently found it in many parts of that country. It is common in the southern part of the State of São Paulo, and DE FREITAS (pp. 347, 450) gives an account of the potential vectors and the animal reservoirs, which include dogs and cats, but rarely wild animals. Chagas's disease occurs in Uruguay, and in some parts a high proportion of *T. infestans* have been found infected. JOSÉ OSIMANI *et al.* (p. 347) report success in the control of bugs by spraying with BHC in a group of infested houses. The work is to be greatly extended.

Since transmission of Chagas's disease depends upon contamination by infective faeces of Triatomid bugs, or by the bugs being crushed on the skin, it is affected by the rapidity of defaecation after feeding and the time spent in feeding (and therefore the time at risk of being crushed). In an experiment to measure these factors WOOD (p. 1093) found that, of 4 species, *T. rubida uhleri* was the most likely to transmit by faeces, and *T. protracta* by being crushed.

The triatomid vectors of Minas Gerais are discussed by PELLEGRINO (p. 450), and of Bolivia by TORRICO (p. 136) ; guineapigs, dogs and cats have been found infected. DDT was not effective against the bugs.

Unidentified trypanosomes have been found in Triatomid bugs by GHOSH and BISWAS (p. 348) in Calcutta ; and FLOCH and ABONNENC (p. 348) describe simian trypanosomes infecting the body cavity of two South American bugs.

GALLIARD and BOUTET (p. 968) investigated the possibility of eliminating or preventing *T. cruzi* infection of the alimentary tract of reduviid bugs by feeding them on animals treated with drugs known to have an effect on the vertebrate infection, such as Bayer 7602. The results were not encouraging.

Aetiology

WOOD (p. 793) traces in detail the development of leishmanial forms of *T. cruzi* in mice, into the trypanosomal form. There is no evidence of a crithidial stage, as some workers have supposed. PIZZI (p. 531) has published the first of a series of cytological studies of culture forms of *T. cruzi* based on examinations of fresh and stained preparations. The culture forms are usually in the crithidial stage.

SENECA and HENDERSON (p. 1092) show that *T. cruzi* or *Leishmania donovani* grown in media in cellulose sacs, produce substances inhibitory to growth, which are dialysable and which are specific.

BACKHOUSE and BOLLIGER (p. 1094) show that the Australian marsupial *Trichosurus vulpecula* is susceptible to infection with *T. cruzi*, and is suitable for the study of immunity. They describe the pathological features of the infection in this animal.

Clinical Findings : Treatment

MUNIZ and DOS SANTOS (p. 965) discuss heterophile antibodies in Chagas's disease ; details should be sought in the original. Since these antibodies can react with Forssman antigens in complement-fixation tests, their presence constitutes a potential source of error if antigens for the diagnosis of certain parasitic infections are prepared from guineapigs or similar animals. MUNIZ and DOS SANTOS (p. 966) have developed a conditioned haemolysis test for

Chagas's disease which avoids errors which might arise in connexion with heterophile antibodies. Red cells are sensitized with a polysaccharide fraction prepared from *T. cruzi*. MUNIZ (p. 967) has obtained encouraging results. RODRIGUEZ M. (p. 1093) has used the complement-fixation test with the Davis antigen, and reports results on blood from suspects and from apparently healthy people.

A death from congestive heart failure in the acute stage of Chagas's disease is recorded by ENOS and ELTON (p. 240), who found leishmania forms of *T. cruzi* in the heart muscle of an American soldier in Panama. Cases of chronic myocarditis associated with Chagas's disease, and presumably due to it, are described by DE SOLDATI and RABENKO (p. 878), who gave Repodral in treatment, with some benefit.

There may occur a condition of microphthalmia, one eye being affected. BORZONE (p. 794) thinks that this may be a sequela of Romana's sign.

GOBLE (p. 1095) has used young mice infected with *T. cruzi* in tests of drugs.

In an investigation of certain drugs which have been used for *T. cruzi* infections, GALLIARD and BOUTET (p. 720) found that none was effective against tissue forms, and not even 7602 Ac prevented the transformation of metacyclic forms into tissue forms, though that drug and also lomidine, when given prophylactically, prevented the appearance of blood forms. Certain antibiotics were quite inactive.

In mice infected with *T. cruzi*, JARPA *et al.* (p. 1096) found that a compound of quinine sulphate and pentaquine phosphate was the only drug tested which showed favourable action; it had a marked effect on parasitaemia.

Terramycin seems to be useless against *T. cruzi* (AGOSÍN *et al.*, p. 720).

AMREIN (p. 877) has investigated the action of tyrocidine on *T. cruzi* in culture: growth is adversely affected in concentrations of 100 µgm. per ml. or more.

OTHER TRYPANOSOMIASSES

DE LEON (p. 532) discusses *T. rangeli* infection of man in Guatemala, where he has seen 20 cases in young children. The parasites are scanty, and other cases may therefore have been missed. There was no evidence that the infection caused any illness or gave rise to any symptoms. In some of the children there was enlargement of the cardiac shadow which may have been due to trypanosomiasis. The vector is *Rhodnius prolixus*. An infection, probably with *T. rangeli*, has been found by BORZONE *et al.* (p. 349) in a child and a dog in Argentina.

Charles Wilcocks

MALARIA

COLLIGNON, E. & JUILLAN, M. Les indices endémiques palustres dans la Station expérimentale du Marais des Ouled Mendil en 1951. [**Indices of Endemic Malaria in the Ouled Mendil Marshes Experimental Station in 1951**] *Arch. Inst. Pasteur d'Algérie*. 1951, Dec., v. 29, No. 4, 277-9, 1 plan.

This paper brings up to 1951 the indices recorded previously for the years 1946-50 [this *Bulletin*, 1952, v. 49, 220], and compares those for all 6 years.

The spring and autumn indices are shown in respect of four African groups living or working in the neighbourhood of the experimental station. The dispositions of these groups are shown in a plan.

In all cases, the autumn indices were again lower than the spring indices, except in the case of one group in which the splenic index in the autumn was 4 per cent. compared with 3 per cent. in the spring.

The actual total figures, which were considerably lower than those of the previous years, were as follows :—

| | Number examined | Splenic index | Average size of enlarged spleen | Splenometric index |
|------------|--------------------|------------------|---------------------------------------|-----------------------|
| Spring ... | 378 | 2.8 per cent. | 1.18 | 3.3 |
| Autumn ... | 275 | 2.1 per cent. | 1 | 2 |

H. J. O'D. Burke-Gaffney

MOHI-UD-DIN, A. & RAHIM, A. **Abnormal Forms of *Plasmodium vivax*.** *Pakistan J. of Health.* 1951, Oct., v. 1, No. 3, 9-15, 1 chart & 40 figs. on pl. [25 refs.]

A man aged 20 years was admitted to hospital in Karachi with fever and slight enlargement of the spleen. A single dose of camoquin (0.6 gm.) was given, the patient recovered quickly and suffered from no relapses during the next 8 months. Blood films taken before treatment showed the presence of malaria parasites of an unusual morphology. Parasite density was 120 per 10,000 red blood cells, in which were included 7 per cent. gametocytes and 42 per cent. schizonts, though not a single mature schizont was encountered. Multiple infection of erythrocytes was common; Schüffner's dots appeared early but were never prominent; gross enlargement of the red cell (producing an average diameter of $10.7\ \mu$) occurred, and distorted or oval forms were numerous. The parasites themselves were feebly amoeboid, band forms were fairly common, chromatin was divided into as many as 13 blocks, and pigment was sometimes completely absent. Occasional parasites were found free in the plasma.

In a good discussion the authors show that the organism was probably an aberrant form of *Plasmodium vivax*, though it possessed certain features characteristic of *P. ovale*; in other respects it resembled descriptions of the "doubtful" species *P. wilsoni*. [The rapid response to drugs is another point in favour of the infection being *P. ovale*; but in the opinion of the reviewer, the authors are entirely right in their attitude to diagnosis, *i.e.*, in a country where the rare parasite is hitherto unknown, one should refrain from diagnosing it until the species is confirmed after transmission.]

P. C. C. Garnham

MARYON, M., LEE, P. & SHUTE, P. G. **Experimental Hybridization of *Anopheles maculipennis* var. *atroparvus* Meigen and *Anopheles quadrimaculatus* Say.** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1951, Sept. 15, v. 26, Pts. 7/9, 109-11.

The mosquitoes used in this experiment were from laboratory strains. The *atroparvus* stock was originally obtained from Kent and had been cultured for 18 years. The *quadrimaculatus* were originally brought from America and a colony was given to the authors in 1946.

The crossing experiments were done with virgin adults of the two species in $2\frac{1}{2}$ cu. ft. netted cages kept in a room at 80°F. (27°C.). The mosquitoes were left together for 12 days, fed on 10 per cent. dextrose in water, and

occasionally offered blood from a human arm or a rabbit. The results may be summarized thus :—

| | <i>atroparvus</i> ♀ <i>quadrимaculatus</i> ♂ | | <i>quadrимaculatus</i> ♀ <i>atroparvus</i> ♂ | |
|-------------------------|---|-----------------|---|-----------------|
| | No. | % died | No. | % died |
| Females | 51 | — | 70 | — |
| Males | 200 | — | 160 | — |
| Females laying eggs ... | 17 | — | 19 | — |
| Egg batches | 24 | 29 ¹ | 60 | 42 ¹ |
| Pupae | 115 | 23 | 77 | 27 |
| Adults | 89 | 97 ² | 56 | 66 ² |

¹ i.e., not hatching

² in 24 hours or less.

All the adults which emerged or tried to emerge were females ; no males were obtained in either cross. The three females which emerged normally from the *atrop.* ♀ and *quad.* ♂ cross, refused to feed on blood or dextrose : of the 19 females which survived in the other cross, 11 took human blood and 2 fed several times. But these hybrid females refused to back-cross with either parental strain. The authors observe that *A. atroparvus* and *A. quadrимaculatus* belong to the same group complex, though they are as widely separated as *atroparvus* and *sacharovi*. The eggs are quite distinct and adult males can be distinguished by their genitalia. There are also bionomic differences, *quadrимaculatus* being more anthropophilic than *atroparvus*. Another difference (shown in laboratory tests) is that *quadrимaculatus* can be infected with a certain W. African strain of *P. falciparum*, whereas *atroparvus* cannot. Results in this present paper show that the two species will not hybridize.

J. R. Busvine

TRAPIDO, H. **Factors influencing the Search for Anopheline Larvae in Sardinia.** *J. National Malaria Soc.* 1951, Dec., v. 10, No. 4, 318-26, 4 figs.

The organization ERLAAS, which has been attempting to eradicate indigenous mosquitoes from Sardinia, has encountered very great difficulties. Despite the most careful searching by large numbers of scouts, *Anopheles maculipennis labranchiae* continued to be found occasionally in areas which had been thought to be free of this mosquito for as much as two years. Dr. Trapido, who visited the organization in 1950, spent some months investigating the problem of detecting sparse populations of larvae by dipping methods. Two examples from the field will show how inadequate is normal dipping for discovering rare larvae. A strip of water measuring 40 × 2 metres and $\frac{1}{2}$ metre deep was suspected of being positive. One larva of *A. m. labranchiae* was found by chance at the fourth dip. Then 15 men began to make a systematic search of this restricted area and, after 10 minutes (360 dips later !), another larva was found. Continued dipping for an hour produced 19 more larvae. In another area, a marsh was searched by a chain of 30 men working gradually across it. The first larva was found after 4 hours (after 17,000 dips !) and, by concentrating the men in the vicinity, 40 more larvae were taken. No others were found in the remainder of the swamp. These facts cast doubt on the value of negative reports by a single scout searching a considerable number of breeding places per day.

The numbers and types of larvae which are discovered by dipping methods are shown to be affected by the behaviour of larvae after disturbance. Larvae of 4 different species (*A. m. labranchiae*, *A. claviger*, *A. hispaniola* and *A. algeriensis*) which were discovered at various sites, were tested to determine the effects of mechanical disturbance on their behaviour. All forms dived to the bottom and returned to the surface after an interval. Numerous trials established the fact that some forms returned to the surface more rapidly than others.

| Time after disturbance | Per cent. still submerged | | | |
|------------------------|---------------------------|-----------------|-------------------|--------------------|
| | <i>labranchiae</i> | <i>claviger</i> | <i>hispaniola</i> | <i>algeriensis</i> |
| 5 sec. | 7 | 78 | 93 | 87 |
| 30 sec. | 3 | 61 | 58 | 68 |
| 1 min. | 2 | 39 | 36 | 45 |
| 10 min. | 0 | 2 | 3 | 0 |

It is clear that *A. m. labranchiae* is unable to remain submerged as long as the other species, which possibly depend to some extent on cuticular respiration.

In addition to the influence on observations by dipping, this habit of remaining submerged after disturbance may enable some species of mosquito larvae to escape oily larvicides, at least when these are used on flowing water and may be carried away in a relatively short period.

The paper is illustrated by four photographs of breeding places.

J. R. Busvine

BERNET, M. Influence du développement économique sur l'anophélisme en A. O. F. [**Influence of Economic Development on Anophelism in French West Africa**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 689-95.

The author suggests that malaria continues to be a problem in French West Africa, in spite of all that has been, and is being, done to control it, because of the presence there of *Anopheles gambiae*. In contrast to the European species this anopheline, far from being discouraged by human activities, takes advantage of these activities because they provide it with vastly increased numbers of breeding places and also with transport to take it from place to place.

Some of these activities are briefly described and are all well known to favour the breeding and spread of *A. gambiae* in other parts of Africa. They include particular methods of cultivation of rice, bananas and market garden produce; animal husbandry, which involves the creation of hoof-prints by cattle and wallows by pigs; industries such as mining and logging; the construction of railways; house-building and transport by road, rail and water.

All these events, which are essential in a developing economy, strain the resources of the hygiene services and demand a corresponding increase in staff and equipment.

H. S. Leeson

CHANG, S. L. & RICHART, F. E., Jr. **Studies on Anopheline Larvae. I. The Anatomy and Function of the so-called 'Notched Organs' of Nuttall and Shipley on the Thorax of Larvae of *Anopheles quadrimaculatus*.** *J. National Malaria Soc.* 1951, Dec., v. 10, No. 4, 287-92, 4 figs.

A detailed study of the "notched organs" of the larva of *Anopheles quadrimaculatus* reveals that they not only help to keep the larva at the surface of the

water but it seems that they are also the future respiratory trumpets of the pupa and are present in all the instars. [IMMS in 1907 suggested that they were possibly derived from a pair of prothoracic spiracles which have been lost in the *Culicidae*.]

Their relationship to the respiratory system was confirmed by the examination (by a direct-light-illuminated microscope) of larvae in coloured water and of larvae treated with Sudan II in kerosene to demonstrate the tracheae. The prepupal trumpets are shut off from the tracheae by the closed ends of the tubular section which joins the bottom of the "cup" to the trachea on each side of the thorax.

In larvae of *Aedes aegypti*, though the "cup" is present, the external membranous part is lacking, perhaps because these larvae have no need of organs to keep the anterior part of the body floating at the water surface.

H. S. Leeson

FAIR, G. M., CHANG, S. L. & RICHART, F. E., Jr. **Studies on Anopheline Larvae.**

II. The Mechanism involved in the Flotation of Larvae of *A. quadrimaculatus* on a Water Surface. *J. National Malaria Soc.* 1951, Dec., v. 10, No. 4, 293-305, 12 figs.

This report presents an analysis of data obtained in a mathematical consideration of the forces that are involved in the floatation of the larva of *Anopheles quadrimaculatus*. From these data the authors conclude that the posterior respiratory apparatus which is essential for floating while the larva is breathing at the water surface is the most water-resisting part of the larva; that the prepupal trumpets (*i.e.*, the "notched organs") which are used for floating during feeding are wetted more readily and that the palmate hairs which are auxiliary floating structures are the first to become wetted when the surface tension of the water is lowered.

H. S. Leeson

SINGH, J., RAMAKRISHNAN, S. P. & PRAKASH, S. **Human Plasma as Antigen in the Preparation of Precipitin Serum.** [Correspondence.] *Nature*. 1952, Jan. 26, 157.

For over 3 years, the authors, in the Malaria Institute of India, have been using human plasma instead of serum as an antigen for the preparation of anti-human precipitin serum. Twenty-five rabbits and 29 fowls were immunized with citrated human plasma, by the usual single- and multiple-dose techniques. Ten rabbits and 5 fowls provided specific antisera in titres of 1/1,000 to 1/5,000. It is evident that the use of human plasma is successful for this purpose and has the advantage that it is more readily available (from blood banks) than is serum obtained from individual volunteers.

Those who have occasion to prepare precipitin sera for determining the sources of mosquito blood meals, or for other purposes, will find this experience useful.

H. J. O'D. Burke-Gaffney

EYLES, D. E. & YOUNG, M. D. **The Duration of Untreated or Inadequately treated *Plasmodium falciparum* Infections in the Human Host.** *J. National Malaria Soc.* 1951, Dec., v. 10, No. 4, 327-36, 3 figs.

Thirty-eight Negroes suffering from neurosyphilis were inoculated with a strain of *Plasmodium falciparum* encountered near the Santee-Cooper reservoirs in South Carolina and known as the Santee-Cooper strain. Thirteen were inoculated by mosquito bite, the remaining 25 by infected blood. All were observed through the long primary period during which continuous parasitaemia

persisted. Twenty-two patients, 9 naturally infected and 13 inoculated with infected blood, were followed throughout the duration of infection and for 6 months after parasites were last observed. Parasitaemia persisted in these 22 patients over an average period of 222 ± 25 days. In 3 cases parasites were observed periodically in the peripheral blood for more than one year, the longest period being 480 days. It is concluded that about one per cent. of the infections, if contracted late in the malaria season, might persist through the following and into the second following malaria season.

A study of the whole group of 38 showed that the initial period of continuous parasitaemia lasted on an average 121 ± 9 days, the clinical attack coinciding with the first few days of the period. During this time there were cyclical variations in parasite density, but successive cycle peaks became progressively lower till densities of only a few parasites per cmm. were reached. Following the continuous phase, parasitaemia was of an intermittent, cyclical type, with each successive peak generally attaining a lower parasite density. This period averaged 100 ± 21 days.

The length of total duration of the infection and that of continuous parasitaemia were positively correlated with the maximum parasite density observed during the clinical phase of the infection, from which it is concluded that the same factor, or factors, are involved in the mechanism in each case.

The findings recorded confirm the deduction drawn from field observations that *P. falciparum* passes the winter in temperate zones in the human host.

[This paper would have been still more valuable had it included data relating to the prevalence and density of gametocytes.]

G. Covell

BUENO GARCIA, A. Nefropatías palúdicas. [**Malarial Nephropathies**] *Medicina*. Mexico. 1951, Nov. 25, v. 31, No. 640, 464-6.

In 1889 Laveran described a case of malarial nephropathy and since then several others have been reported whose main features have been oedema of renal type, perhaps anasarca, lumbar pain, oliguria, nocturnal incontinence, hyperchromia, attacks of dyspnoea with cardiac disturbance, jaundice, dysenteriform colitis and tenesmus, raised arterial pressure and red corpuscles in the urine. References are made to a few of these cases and the author then relates one of his own, in a boy of 13 years.

The moral he draws from all of these is that the malarial nature of the nephritis is often quite overlooked, at all events is not suspected or looked for till later, although anti-malaria treatment is most successful and he stresses the importance of bearing the possibility in mind and of careful search for the plasmodium in the blood, for often it is present very scantily, though pigmented cells are numerous. He refers, in a corollary to this, to the fact that MARCK and FOYD [reference not given], in the course of examining 300 malarial patients, found albuminuria and haematuria in 19 and, in one, a clear picture of acute glomerular nephritis.

H. Harold Scott

PAYNE, E. H., VILLAREJOS, V. M., SHARP, E. A., REINERTSON, J. W. & WILLE, W. S. **Intravenous Amodiaquin (Camoquin) in Naturally Acquired and Induced Malaria.** *Amer. J. Trop. Med.* 1951, Nov., v. 31, No. 6, 698-702.

Five patients with naturally acquired *Plasmodium vivax* infections, which had been active for periods of 2 weeks to 8 months, were each treated with a

single intravenous injection of 5 ml. of amodiaquin (Camoquin) solution containing 30 mgm. amodiaquin base in each ml. Parasites were no longer detected in the peripheral blood after 12 to 18 hours and the temperature fell to normal within the same period. Relapses occurred in two of the patients on the 22nd and 27th day respectively. These were treated with another dose of amodiaquin, after which no further evidence of infection was noted. A number of biochemical tests carried out before, during and after treatment showed no evidence of any impairment of function following this medication.

Twenty-three patients under treatment with malaria therapy by means of blood-induced *P. vivax* infection each received two intravenous injections of 150 mgm. amodiaquin base, with an interval of 3 hours between each injection, to terminate the attack. Clinical response to the drug was uniformly satisfactory and rapid in all cases. One patient suffered a recrudescence; the treatment was repeated and there was no further evidence of infection.

No toxic effects were observed in any of the patients thus treated.

G. Covell

VILLAREJOS M., V. M. **Experiences with Amodiaquin (Camoquin) a New Synthetic Antimalarial.** *Amer. J. Trop. Med.* 1951, Nov., v. 31, No. 6, 703-6. [10 refs.]

Three hundred and fifty-nine cases of malaria (108 *P. falciparum*, 232 *P. vivax* and 18 mixed infections) were treated with amodiaquin (Camoquin) in La Paz, Bolivia, under circumstances which precluded reinfection, over a period of 2 years. At the commencement the dosage given was 0.4 gm. by mouth twice daily for 2 days. Later this was replaced by a single-dose treatment of 15 mgm./kgm. body-weight, which proved more effective. This was subsequently reduced to an adult dose of 0.8 gm., representing approximately 10 mgm./kgm. body-weight, with equally satisfactory results.

Blood smears became negative for trophozoites of *P. falciparum* and all forms of *P. vivax* within 24 hours in 80 per cent. of the cases and 4 hours later the remaining 20 per cent. were also negative for these forms. A noticeable feature was the rapid abatement of clinical symptoms, particularly the disappearance of headache. No toxic effects were noted.

Radical cure was effected in *P. falciparum* infections. It is claimed also that the relapse rate in *P. vivax* infections was reduced and the interval between relapses increased by this treatment.

G. Covell

KASS, E. H., GEIMAN, Q. M. & FINLAND, M. **Effects of ACTH on Induced Malaria in Man.** *New England J. of Med.* 1951, Dec. 27, v. 245, No. 26, 1000-1002, 3 figs. [15 refs.]

"ACTH was administered to 3 patients with induced benign tertian malaria; their responses were compared with those of 7 patients with malaria who did not receive ACTH. ACTH reduced slightly the amount of fever occurring during the paroxysms but did not affect the periodicity or the height of the temperature responses. However, the parasite counts in the patients receiving the hormone were significantly higher than in the controls. The observations suggest that the action of ACTH in reducing resistance to infection may include an effect on components of host resistance not directly related to the acute inflammatory response and probably not directly concerned with antibody production."

RACHOU, R. G. Erradicação de anofelinos transmissôres de malária. II. Sinópsede campanhas já realizadas e em realização. [Eradication of Malaria Vectors. II. Synopsis of Current Campaigns of Anopheline Eradication] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1951, Apr., v. 3, No. 2, 327-38.

The English summary appended to the paper is as follows :—

“ In this paper the author makes a summary of the following eradication campaigns of anophelines :

1. *A. gambiae* in Brasil.
2. *A. gambiae* in Egypt.
3. *A. labranchiae* in Sardinia.
4. *A. superpictus*, *A. elutus* and *A. bifurcatus* in Cyprus.
5. *A. pseudopunctipennis* in Chile.”

GARRETT-JONES, C. An Experiment in Trapping and Controlling *Anopheles maculipennis* in North Iran. *Bull. World Health Organization*. Geneva. 1951, v. 4, No. 4, 547-62, 3 figs.

This experiment was carried out during August to October 1950 in the valley of Kalardasht in the Elburz mountains in northern Iran. The rainfall exceeds 40 inches (102 cm.) annually and there is no pronounced dry season. There are 25 villages in the valley with an average population of 250-300, and spleen rates in some of them (27 to 83 per cent.) indicate a high degree of malaria incidence. The rooms and stables in 15 of the villages were treated with different forms of DDT to leave a deposit of 2 gm. of DDT per square m. of surface ; in two villages the dose was 1 gm. per square m.

The effect of the insecticide was assessed by observing the numbers of mosquitoes caught in 10 outlet traps affixed to the window spaces. The traps were made of muslin secured to wooden frames of different sizes up to 36×30×15 inches (91·4×76·2×38·1 cm.). In the upper half of the muslin on the side against the window opening each trap had a non-return horizontal slit through which mosquitoes attempting to leave the house entered the trap. The trapped mosquitoes were collected each morning and evening through a sleeve in the trap wall. It was not possible to observe the 24-hour death-rate or to do dissections or blood precipitin tests.

Over 2,700 mosquitoes were taken in the 10 traps and over 99 per cent. of them were *Anopheles maculipennis maculipennis*, the only common endophilic mosquito. A definite and rapid decline in numbers of mosquitoes was recorded from August to October when no more were found, though inspections were continued until 7th November. Some of the decline must of course have been due to seasonal reductions, but short-term observations showed sharp reductions after treatment in every case, amounting to between 76 and 91 per cent. in 5 days, when compared with figures for the 5 days before treatment. Evening catches fell more noticeably than the morning ones and it seemed that the morning catches represented the seasonal reductions only. Nevertheless it is not possible to say how much of the reduction was due to season and how much to DDT. It is certain though that many male mosquitoes entered and left during the night and that many unfed females entered and left without feeding or resting, while those which did feed did not rest or get poisoned before leaving.

H. S. Leeson

ARAGÃO, M. B. Nota preliminar sôbre a ação bromelícida de alguns compostos de cobre, insolúveis na água. [**Preliminary Note on the Destructive Action on Bromeliads of Certain Copper Salts**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1951, Apr., v. 3, No. 2, 373-6. English summary (7 lines).

In Trinidad and the northern parts of the continent of South America, Anopheline mosquitoes of the sub-genus *Kerteszia* breed in the axils of Bromeliads and take an active part in the transmission of malaria. It has been known for some time that copper salts are exceedingly effective in destroying Bromeliads. The present author states that of several salts, copper aceto-arsenate is the most effective; he does not produce quantitative evidence and does not seem to have compared this material with copper sulphate, which has been used by others.

P. A. Buxton

FABIANI, G., VARGUES, R., FULCHIRON, G., GRELLET, P. & VERAINE, A. Facteurs et signification de la période prépatente dans le paludisme expérimental à *Plasmodium berghei*. [**Factors and Significance of the Pre-patent Period in *P. berghei* Infection**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 580-91, 1 fig.

In a study on 120 white rats and 200 white mice, the authors investigated the factors determining infection of these animals with *Plasmodium berghei*. They standardized the dose by estimating the number of parasites seen per 100 erythrocytes in a thin film, mixing the blood with Ringer's fluid and counting the red cells in a haemocytometer. Citrate solutions were found to be much less suitable. The length of the prepatent period varied in inverse proportion to the number of parasites inoculated; with a dose below 10,000, infection did not always follow, and with a single parasite it never occurred (even in splenectomized animals). The second factor influencing infection was the quality of the inoculum: blood taken at the beginning of the infection in the donor gave rise to a shorter pre-patent period in the recipient than did blood taken at the end. The route of inoculation was the third factor: intracardiac inoculation was followed by the shortest and intranasal the longest pre-patent periods; in the former, parasites were detectable immediately in the tail blood of the recipient, in the latter not for 8 to 10 days.

The authors discuss the significance of the pre-patent period, and conclude that it is due neither to a condition of latency such as is seen in bacterial diseases, nor to a preliminary tissue phase, but is the result of multiplication of parasites in the blood until sufficient are produced for them to become visible. They point out that the course of *P. berghei* infection is the same whatever the pre-patent period, in contrast to bacterial infections where true immunity occurs and where the disease is milder the longer the incubation period. [SCHNEIDER and SCHNEIDER (this *Bulletin*, 1950, v. 47, 1182) and GALLIARD and LAPIERRE (*ibid.*, 1951, v. 48, 869) had already shown that there is no such thing as a true pre-patent period in cases of *P. berghei* malaria resulting from blood inoculation; the use of the term in this connexion may be misleading.]

P. C. C. Garnham

FABIANI, G., VARGUES, R., GRELLET, P. & CLAUSSE, J. Influence de la splénectomie sur des rats blancs spontanément guéris d'une infection expérimentale à *Plasmodium berghei*. [**Influence of Splenectomy on White Rats Spontaneously Cured of Experimental *Plasmodium berghei* Infection**] *C.R. Soc. Biol.* 1951, Aug., v. 145, Nos. 15/16, 1131-4.

Infections of *Plasmodium berghei* in white rats are either fatal or result in spontaneous cure. Fifteen rats were splenectomized 2 days to one month

after apparent cure. They had previously been tested (a) to see if their blood were still infective to mice—2 out of 9 proving positive, and (b) to see if re-inoculation of parasites would result in an infection—4 out of 8 exhibited a few parasites for a fleeting period. Eleven of these animals suffered severe relapses and 10 died; 3 had mild infections, and one remained persistently free of parasites. Heavy infections of *Bartonella muris* followed splenectomy, and actually killed the one rat in which *P. berghei* failed to return. The authors draw attention to the possible importance of bartonellosis in interpreting the results of such experiments. [See also this *Bulletin*, 1951, v. 48, 869.]

P. C. C. Garnham

FABIANI, G., VARGUES, R., FULCHIRON, G. & GRELLET, P. Étude des diverses voies d'inoculation expérimentales de *Plasmodium berghei* chez le rat blanc et la souris blanche. [**Study of Different Routes for Experimental Inoculation of White Rats and Mice with *Plasmodium berghei***] *C.R. Soc. Biol.* 1951, Aug., v. 145, Nos. 15/16, 1156-7.

The effect of inoculating *Plasmodium berghei* (in standardized doses) by using different routes was tested on white rats and mice. Intracardiac, intraperitoneal and intracerebral inoculation produced identical results, with a short pre-patent period (2-3 days in rats, 4 days in mice). Inoculation into the eye was followed by much the same result; inoculation into the dermis, and into the lungs (*via* the nose) did not give rise so constantly to infection, and the pre-patent period was much lengthened. If the inoculation was performed subcutaneously, mice and rats responded differently; in mice, the pre-patent period was prolonged and there were 10 per cent. failures to take; in rats, 10 out of 12 failed to show parasites, and the remaining two showed a transient light parasitaemia. Successive intracerebral passages did not produce a neurotropic strain, and intradermal inoculation did not cause local sensitivity.

[Although the authors standardized the infective doses, they did not apparently use animals of the same age or weight; GALLIARD and LAPIERRE (this *Bulletin*, 1951, v. 48, 869) have demonstrated the immense importance of this factor, and possible failure to take it into account explains the anomalous results of subcutaneous inoculation of the parasite into rats.]

P. C. C. Garnham

FABIANI, G., JAHIER, H. & FULCHIRON, G. Infection trans-cutanée des rats et souris nouveau-nés par *Plasmodium berghei*. [**Infection of Rats and New-born Mice with *Plasmodium berghei* by Scarification**] *C.R. Soc. Biol.* 1951, Aug., v. 145, Nos. 15/16, 1154-5.

Heavily infected blood containing *Plasmodium berghei* was placed on the skin near the groin of 15 new-born rats and mice, but the animals failed to become infected. The experiment was repeated on 14 new-born mice and 3 rats after a very light scarification of the skin, when 3 mice and all the baby rats developed the disease. [Such a mode of infection may be responsible for some of the alleged cases of congenital malaria in man.]

P. C. C. Garnham

FABIANI, G., JAHIER, H., VARGUES, R. & FULCHIRON, G. Réalisation du paludisme congénital chez le rat et la souris par traversée placentaire du *Plasmodium berghei*. [Development of Congenital Malaria in Rats and Mice by Transplacental Passage of *Plasmodium berghei*] *C.R. Soc. Biol.* 1951, Aug., v. 145, Nos. 15/16, 1158-9.

Six mice were infected with *Plasmodium berghei* early in pregnancy. Three gave birth to litters which died in infancy through an inadequate milk supply, but showed no malaria. Two mice were killed on the 15th day of gestation, and the foetuses were examined with negative results. The sixth mouse had a miscarriage near term and of the 8 young, which were born dead, one showed scanty parasites in the heart blood and liver and a second a few parasites in blood from the liver.

Three rats were also inoculated at the start of pregnancy; two gave birth to uninfected progeny, the third died of malaria on the 18th day of gestation. Seven young were removed from the uterus; 2 showed a few parasites in the heart blood, and pigment or parasites in the liver; the remainder were uninfected.

The authors think that the comparative rarity of congenital infection (4 of the progeny infected out of 63), and the mildness of the disease are partly due to transplacental passage of antibodies from the mother.

P. C. C. Garnham

CAVACEPPI, Luciana. Durata del ciclo endoistiocitario del *Plasmodium gallinaceum* determinata mediante ripetute biopsie di corteccia cerebrale. [Duration of Exo-erythrocytic Cycle of *Plasmodium gallinaceum*, determined by repeated Biopsy of the Cerebral Cortex] *Riv. di Parassit.* Rome. 1951, July, v. 12, No. 3, 163-8, 1 chart. English summary.

One of the objects of the experiments described in this paper was to determine the ability of exo-erythrocytic forms of *Plasmodium gallinaceum* to invade the endothelial cells of the brain and the erythrocytes, when passaged from chicken to chicken with emulsions of brain tissue containing EE forms. The other object was to determine, by repeated biopsy of the cerebral cortex, the exact time when the EE stages disappear in the infected bird.

For this purpose, daily examination of the blood and of brain tissue obtained by biopsy were made on 29 birds in the course of 7 passages. It was found that in each passage, the parasites were capable of invading both the endothelial and red blood cells. However, the development of the EE forms came to an end 25 days after the inoculation of the infective material. After this period brain material obtained by biopsy up to the 80th day failed to reveal any EE forms, but the erythrocytic development continued without interruption. From these observations it is concluded that the erythrocytic stages alone are responsible for maintaining the infection and producing relapses.

C. A. Hoare

TERZIAN, L. A., WARD, P. A. & STAHLER, N. A New Criterion for the Selection of Compounds for Curative Activity in *Plasmodium vivax* Malaria. *Amer. J. Trop. Med.* 1951, Nov., v. 31, No. 6, 692-7.

In order to avoid some of the difficulties inherent in the use of bird and simian hosts for the screening of potentially active drugs in human malaria, Terzian and his colleagues [this *Bulletin*, 1948, v. 45, 767; 1949, v. 46, 609, 909] have sought new methods of testing by feeding on solutions of drugs mosquito hosts infected with different malarial species. He has shown that there is a definite correlation between the effects of drugs obtained in the sporogonous and schizogonous cycles of the malaria parasite, in so far as

prophylactic effect was concerned, and made it possible to use mosquitoes infected with human strains for evaluation of such activity without having recourse to animal experiments. On the other hand curative effect might be overlooked and the present studies were undertaken with a view to overcoming this difficulty. It was known from the earlier work cited that plasmoquine [pamaquin]—an 8-aminoquinoline—was toxic to sporozoites of *P. gallinaceum*, and that this substance alone of the series tested, exerted a curative effect in *P. vivax* infections. Experiments have now been carried out to test the validity of the assumption that the effectiveness of a drug against the sporozoites of *P. gallinaceum* is related to curative effect in *P. vivax* infections of man. For this purpose substances with activity greater or less than pamaquin in *vivax* malaria have been tested against the sporozoites of *P. gallinaceum* in *Aedes aegypti*. The sole source of nourishment for the mosquitoes was a 4 per cent. sugar solution in which the drugs were dissolved in the desired concentration either prior or subsequent to the blood meal, depending on whether an effect on oöcysts or sporozoites was being observed. The results obtained indicated that the relationship being investigated did hold as a result possibly of the physiological similarity of the forms involved. The new method of test should prove of value in detecting substances therapeutically active in the human infection with comparatively little expenditure in time or money.

J. D. Fulton

SICCA, G. T. L'azione della *Cloroquina* sulla infezione sperimentale da *P. gallinaceum*. [**Action of Chloroquine on *Plasmodium gallinaceum***] *Riv. Italiana d'Igiene*. 1949, July-Aug., v. 9, Nos. 7/8, 211-17. English summary (4 lines).

The author records the results of treatment with chloroquine of fowls experimentally infected with *Plasmodium gallinaceum*. A group of 19 birds weighing 70-320 gm. were treated prophylactically for 6 consecutive days following the inoculation of infected blood, the doses being 5 mgm. for birds weighing up to 100 gm., 10 mgm. for those between 100 and 300 gm., and 20 mgm. for heavier ones. In the smaller birds the treatment resulted in complete suppression of parasitaemia, while in the larger ones it was considerably reduced. On the other hand, the course of infection in control birds was acute, terminating fatally in 5-10 days after the first appearance of parasites. Another group was treated during the height of parasitaemia for 7 days with doses of 20 mgm. In all cases the infection was suppressed after 3-4 days, but the parasites were not eradicated, and some of the birds relapsed and died later.

C. A. Hoare

SAVAGE, A. & MCTAVISH, W. B. *Plasmodium circumflexum* in a Manitoba Duck. *J. Parasitology*. 1951, Dec., v. 37, No. 6, 533-4, 1 fig.

An eider duck (*Arctonetta fischeri*) about a month old was captured close to the Bering Sea; it was taken *via* Alaska and British Columbia to the bird sanctuary on Lake Manitoba where it arrived ill on July 31st, 1950. It died shortly afterwards and blood films showed numerous malaria parasites which were identified as *Plasmodium circumflexum*. The schizonts contained 14 to 29 merozoites, they rarely encircled the host cell nucleus though sometimes displaced it; the gametocytes were usually elongate and often encircled the nucleus. It is stated that this was the first out of many hundred specimens of migratory ducks to be found with malaria parasites, though they are known to be susceptible in the laboratory to *P. circumflexum*.

P. C. C. Garnham

PARAENSE, W. L. **A Survey on the Occurrence of "Plasmodium juxtanucleare" in Bambui (State of Minas Gerais).** *Mem. Inst. Oswaldo Cruz.* 1949, Sept.-Dec., v. 47, Nos. 3/4, 361-5. [Portuguese version 355-9.]

A survey of the fowls of Bambui in the Western State of Minas Gerais, Brazil, revealed in 1947 an incidence of 21 per cent. *Plasmodium juxtanucleare* [this *Bulletin*, 1949, v. 46, 447]. In 1949 a more detailed survey was undertaken in which 300 adult and 100 young birds were examined. Again 21 per cent. of the adult birds were found infected; no blood parasites of any sort were found in the chicks. It is pointed out that the true infection index is probably much higher, but sub-inoculations of blood into clean birds would be necessary to determine this.

In an unsuccessful attempt to find the natural host 125 wild birds were examined; other malaria parasites (including *P. nucleophilum* and *P. circumflexum* in *Gnorimopsar chopi chopi*, a kind of blackbird) were found in 4 species of birds. Also 17 *Haemoproteus*, 1 *Trypanosoma* and 3 *Haemogregarina* infections were discovered. *Culex fatigans* failed to become infected with *P. juxtanucleare* in attempted transmission experiments. P. C. C. Garnham

FALLIS, A. M., DAVIES, D. M. & VICKERS, Marjorie A. **Life History of *Leucocytozoon simondi* Mathis and Leger in Natural and Experimental Infections and Blood Changes produced in the Avian Host.** *Canadian J. Zool.* 1951, Dec., v. 29, No. 6, 305-28, 15 figs. [8 (3 coloured) on 2 pls.] [20 refs.]

Domestic ducks, 1 to 6 weeks old, were infected with *Leucocytozoon simondi* (1) by exposing them to the bites of wild flies in nature (in Ontario), (2) by injecting suspensions in Tyrode's solution of laboratory infected flies, intraperitoneally or intravenously, or (3) by the inoculation of saline suspensions of the organs of infected ducks. The minimum pre-patent period was $5\frac{1}{2}$ days; parasitaemia reached its height in an average of 6 days, then (if the birds did not die) declined rapidly but remained at a low chronic level from one summer to the next. Young gametocytes were found both in erythrocytes and lymphocytes; two types of mature forms were seen (the "round" form and the "spindle" form). [The authors appear to assume that these varying forms all belonged to the single species—from the nature of the experiments, there is surely a possibility that 2 or more species of *Leucocytozoon* were concerned.] Asexual forms were found in the spleen and other organs in macrophage cells, growing into megaloschizonts up to 168μ in diameter containing more than a million merozoites. Tissues from birds which had been infected up to 9 days earlier (but not longer) proved infective on inoculation. Blood taken from birds which had been exposed to infection 3 to $4\frac{1}{2}$ days earlier was also infectious, probably because asexual stages got into lymphocytes which circulated for a time, became caught up in various organs where they changed into macrophages and in which megaloschizonts finally developed. Blood inoculations were also positive when the original infection was older—7 days—and after gametocytes appeared in the blood.

The sporogonic cycle was studied by allowing *Simulium venustum* and *S. parnassum* to feed on infected ducks and dissecting them at various intervals after the feeds. Large oökinetes were found in the stomach 4 to 6 hours after the flies had ingested the blood. Forty to 60 hours after the feed, numerous round parasites (8.2μ in diameter) with divided chromatin were found in smears of the stomach contents; then 67 hours after the feed, structures resembling mature oöcysts (10μ to 13μ in diameter) were seen in one instance. The latter apparently contained sporozoites ($5-10\mu$ long) which in other cases were seen chiefly in the stomach contents, but also around but not inside the

salivary glands. Suspensions made from glands, guts and whole fly were inoculated into clean ducks which developed the infection. The flies had been fed $2\frac{1}{2}$ to 7 days previously on infected ducks. Transmission by biting was effected by exposing birds to infected flies, and in such cases the beaks were kept shut by tape to exclude infection by the mouth; in fact no infection took place if ducks were deliberately fed on infected flies. No oöcysts could be demonstrated on the outer wall of the stomach, nor sporozoites inside the salivary glands.

[Once again *Simulium* flies have been incriminated as the vector of *Leucocytozoon* sp., but the veil hiding the details of sporogony is still not completely lifted. JOHNSON (*Michigan State Coll. Vet.*, 1945, v. 5, 144) in a summary of earlier work indicated that the cycle in the fly could be as quick as 96 hours after development of the oöcyst *in*, not *on*, the gut wall, with the formation of sporozoites of irregular size and shape about 5μ in length. In all these experiments wild-caught flies were used and it may be that the forms found in the flies (with the exception of the oökinetes) originated from earlier feeds on wild birds. Further work is obviously needed to confirm the remarkable observations on formation of sporozoites inside the stomach—a process so entirely different from that which occurs in malaria, and more resembling the unconfirmed reports of RIVERO (this *Bulletin*, 1948, v. 45, 50) which appeared to show that *Haemoproteus* completes its sporogonic development in 24–72 hours in the gut of *Triatoma* in the oökinete form and that these forms prove infective on feeding to clean pigeons.]

P. C. C. Garnham

ERRATUM

In the abstract of the paper by WILKINSON on the fate of *Anopheles* in huts treated with DDT and BHC [this *Bulletin*, 1951, v. 48, 1074], the word *melas* occurring on lines 10 and 19 should, in each case, read *funestus*.

TRYPANOSOMIASIS

MAILLOT, L. Les glossines, vecteurs de la maladie du sommeil, en A.E.F. [**Tsetse Flies, Vectors of Sleeping Sickness in French Equatorial Africa**] *Bull. Inst. d'Études Centrafricaines*. 1951, No. 2, 63–72, 1 map.

In this short paper the author gives some notes on how tsetse flies may be recognized, particularly the species *Glossina palpalis*, *morsitans* and *tachinoides*. Further notes are given on the biology, infection and geographical distribution in French Equatorial Africa of *G. palpalis*, and there are locality records for the above and for 8 other species, accompanied by a map. H. S. Leeson

HEISCH, R. B. **Presence of Trypanosomes in Bush Babies after eating Infected Rats.** [Correspondence.] *Nature*. 1952, Jan. 19, 118.

In the Medical Research Laboratory, Nairobi, 2 bush babies (*Galago crassicaudatus lasiotis*) were found, 6 weeks after capture, to be heavily infected with polymorphic trypanosomes. It transpired that some weeks earlier they had escaped from captivity and eaten the carcasses of white rats experimentally infected with virulent *T. gambiense*.

The author therefore placed a white rat heavily infected with *T. rhodesiense* in a cage with a bush baby. The rat was at once killed and eaten by the bush baby, which later became infected. The trypanosomes failed to penetrate mucous membranes, so were presumably transmitted through abrasions. The infections were fatal in a month.

Bush babies are formidable enemies of small animals. It is not known whether they can be natural reservoirs of trypanosomes but they have been implicated in the jungle yellow fever cycle. It is conceivable that infection might be acquired if rodents or other small animals harbouring the virus were eaten during periods when mosquito transmission was not occurring.

H. J. O'D. Burke-Gaffney

FERREIRA, F. S. da C. & ROSÁRIO, J. M. Um caso de tripanossomíase humana adquirido por transfusão de sangue. [A Case of Human Trypanosomiasis Transmitted by Blood Transfusion] *Gaz. Méd. Portuguesa*. 1951, v. 4, No. 4, 1030-33, 1 chart.

The English summary appended to the paper is as follows :—

“ The authors present a case of sleeping sickness transmitted by transfusion of total blood from a patient with trypanosomes in circulation (*T. gambiense*), showing too the possibility of precocious nervous alterations after the inoculation of trypanosomes.”

JONCHÈRE, H. Traitement par les diamidines de la phase lymphatico-sanguine de la trypanosomíase humaine en A.O.F. [Diamidines in the Treatment of the Lymphatico-Blood Stage of Trypanosomiasis in French West Africa] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 603-25, 3 graphs.

A detailed account is given of the results of using pentamidine and lomidine for the lymphatico-blood stage of sleeping sickness in French West Africa. A few cases were treated in 1942, and a more intensive investigation was started in 1946 by the S.G.H.M.P. [For a description of this Service see LE ROUZIC and KOCH, this *Bulletin*, 1950, v. 47, 444.] Since 1946 a total of 12,684 patients have been treated, in 10,281 of whom an adequate follow-up has been possible. The failure-rate was 6.1 per cent. The treatment-course became standardized early in the investigation at 5 intramuscular injections, at 2-day intervals, of 3 mgm. lomidine salt per kgm. body-weight, but during the past year the individual dose has been changed to 4 mgm. of the base. In cases where there was some doubt as to whether the infection was frankly in the early stage, two treatment-courses were given. Departures from the main scheme of treatment were very few, and are held to be insufficient to have affected the results appreciably.

The well-known immediate transient reactions to this type of compound were frequent, but delayed serious toxic effects were extremely rare. There were no instances of toxic damage to the nervous system, the liver or the kidneys, and the pyrexial reactions sometimes associated with other trypanocides did not occur. In 1948 there were 5 deaths within about 24 hours of treatment, 4 of which were in aged and feeble subjects. In 1949 there were 3 deaths associated with septic complications at the site of injection. There has been no death attributable to treatment since then.

Most of the relapses occurred within 18 months of treatment. A very few (totalling 11) were recorded as late as 3 to 4 years since treatment, though there is often some question as to whether “ relapses ” occurring later than 6 months are, in fact, not cases of re-infection.

Many of the treatment-failures must be ascribed to the treatment having been given when the infection had already progressed beyond the lymphatico-blood stage. It was given only when the cerebrospinal fluid cell-count was less than 5 per cmm. and the protein less than 25 mgm. per 100 ml., but NEUJEAN [this *Bulletin*, 1951, v. 48, 956] has shown how unreliable the ordinary technique

of cerebrospinal fluid examination can be as a means of determining that the infection has not yet progressed beyond the lymphatico-blood stage.

Relapses recognized as being still in the first stage of infection were very rare, only 3 being noted during the first 6 months after treatment, and 5 during the following 6 months. Relapses diagnosed in the second stage amounted to 6 in which trypanosomes were demonstrable only in the blood or lymph gland juice, 25 in which they were to be found only in the cerebrospinal fluid and 679 in which they could not be found in blood, lymph gland juice or cerebrospinal fluid.

Some workers in the S.G.H.M.P. believe that the trauma of diagnostic lumbar puncture may precipitate a relapse of the second stage type, by permitting trypanosomes to invade the meninges and cerebrospinal fluid, and CHAMBON, in work that is still in progress, believes he has reduced his failure-rate from 6.88 to 4.50 per cent. by the expedient of delaying the diagnostic lumbar puncture till 24 hours after the first ("sterilizing") dose of the course of diamidine injections.

It was not possible, with certainty, to associate an undue relapse-rate with any particular geographical area, though there was a suggestion in some areas that the rate might be higher in zones of unusually high endemicity.

Relapses generally respond to further treatment by the classical remedies no less favourably than primary infections treated at the same stage of the disease.

E. M. Lourie

LAUNOY, L. Étude de l'action thérapeutique curative, du diamidino-diphén-oxy-pentane, sur l'infection expérimentale a *Tr. gambiense* du rat. I. Rapport entre l'âge de l'infection et la dose thérapeutique curative. [**The Therapeutic Activity of Lomidine against *T. gambiense* Infections in the Rat. I. Relationship between Age of Infection and Curative Dosage**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 591-602.

The Yaoundé strain of *T. gambiense*, characterized by its neurotropism in mice and rats, has been used by the author since 1947 [Launoy, this *Bulletin*, 1948, v. 45, 1071]. Some increase in virulence was later reported [Launoy, *ibid.*, 1950, v. 47, 20], and since then there has been no further change. Neurotropism continues to be the predominating feature, and infection in the rat is still typically characterized by the four stages described in 1949, as follows:— (a) blood invasion, apparent 24 to 96 hours after intraperitoneal inoculation; (b) a blood-negative phase (though the blood remains infective), lasting for 5 to 12 days; (c) a re-invasion of the blood, which may either be severe and fatal (about 25 to 30 days after inoculation) or else of an intermittent character; (d) a stage of severe, chronic and irreversible nervous involvement. Stage *d* is specially frequent, as well as prolonged, when treatment has been insufficient or tardy. Locomotor ataxy and paralysis of the hind limbs are very common in this stage, and may persist for several days before death.

Cerebrospinal fluid was obtained from the sub-occipital space either immediately after killing the animal, or else after putting it under barbiturate anaesthesia, and the technique of these procedures is described.

It was found that as the infection proceeds so an increasing dose of lomidine is necessary for cure. If treatment is insufficient, or unduly delayed, the blood may be cleared though trypanosomes remain numerous in the cerebrospinal fluid. It is, however, often possible to show, by sub-inoculation into clean animals, that the apparently cleared blood does in fact still harbour some trypanosomes. Infections produced in such tests are similar to those characteristic of the parent strain, and the trypanosomes show no evidence of acquired resistance to lomidine.

E. M. Lourie

PIRES, F. M. & DE ALMEIDA, C. L. A acção da terramicina na doença do sono (*Trypanosoma gambiense*). [Action of Terramycin on Sleeping Sickness (*T. gambiense*)] *Gaz. Méd. Portuguesa*. 1951, v. 4, No. 4, 1025-9. [13 refs.]

The English summary appended to the paper is as follows :—

"1. In human trypanosomiasis caused by *Trypanosoma gambiense*, Terramycin given orally (1.0 gr. every 6 hours, for 8 days, adding up to 32 grs.) :

(a) Showed no germicidal action ;

(b) Was not able to shun central nervous system's lesions in patients in the lympho-hemogenous period ;

(c) Has no influence on the evolution of meningo-vascularitis and meningo-encephalitis.

"2. In this referred dosage Terramycin was well tolerated and those toxical reactions observed, always slight, were no hindrance to the maintenance of treatment.

"3. The authors finally point out the need of further systematic experiments conducted with the idea of discovering a new effective antibiotic for the treatment of trypanosomiasis, suggesting at the same time, as a possible way to find it, Schiller's method of 'induced antagonisms'."

MORNET, P., LALANNE, A. & CISSOKO, M. Essai de trypano-prévention chimio-thérapique des troupeaux bovins d'exportation. [Studies in Chemoprophylaxis of Trypanosomiasis in Herds of Cattle for Export] *Bull. Serv. Élevage Afrique Occid. Franç.* 1951, Apr.-Sept., v. 4, Nos. 2/3, 7-16, 1 folding map.

KRANEVELD, F. C. & MANSJOER, M. De levensduur van *Trypanosoma evansi* in gecitreeerd ne met 0.5% phenol geconserveerd bloed. [Survival of *Trypanosoma evansi* in Citrated Blood and Blood Preserved with 0.5 per cent. Phenol] Reprinted from *Hemera Zoa*. 1949, Oct., v. 56, No. 5, 286-95. English summary.

KRANEVELD, F. C. & MANSJOER, M. Onderzoekingen over de gevoeligheid voor surra. I. Infectieproeven met een *Trypanosoma* bij caviae, honden en paarden. [Studies on Susceptibility to Surra. I. Transmission Experiments with a Trypanosome in Guinea pigs, Dogs and Horses] Reprinted from *Hemera Zoa*. 1950, Feb., v. 57, No. 2, 88-93. English summary.

KRANEVELD, F. C. & DJAENOEDIN, R. Enkele proeven over immunisatie tegen surra. [Studies in Immunity to Surra] Reprinted from *Hemera Zoa*. 1949, Dec., v. 56, No. 6, 370-78. English summary.

LYSENKO, M. G. Concerning Salicylate Inhibition of Ablastic Activity in *Trypanosoma lewisi* Infection. *J. Parasitology*. 1951, Dec., v. 37, No. 6, 535-44, 1 fig. [29 refs.]

CANTRELL, W. F. & MCGEACHIN, R. L. The Activity of a New Pentavalent Arsenical Compound, α -4-Arsonophenylglycylmonoglyceride, against *Trypanosoma equiperdum* in Mice. *J. Parasitology*. 1951, Dec., v. 37, No. 6, 569-72.

"1. A new pentavalent arsenical, α -4-arsonophenylglycylmonoglyceride, is active against *T. equiperdum* in mice.

"2. The new compound is more active than the corresponding acid but less active than tryparsamide.

"3. Predictions, based on theoretical considerations, about the relative oil : water solubility and the trypanocidal activity of the new compound were confirmed experimentally."

- KRANEVELD, F. C. & MANSJOER, M. Onderzoekingen over bloedparasieten. IV. Trypanosomen bij de kip in Indonesië. [Studies on Blood Parasites. IV. Trypanosomes in a Hen in Indonesia] Reprinted from *Hemera Zoa*. 1951, v. 58, No. 3, 136-45, 2 figs. [10 refs.]

The English summary appended to the paper is as follows :—

"DE HAAN (1911), VON PROWAZEK (1912), and PICARD (1931) found in hens in Indonesia trypanosomes. The present paper contains the record of the occurrence of trypanosomes in a hen in Central Java.

"In twenty smears only 10 trypanosomes were observed suitable to be measured. The measurements obtained were sufficiently close to the figures given by BRUCE *et al.* (1911) for *Trypanosoma gallinarum* to warrant identification.

"In the Bogor district (W. Java) native hens (600) were examined and after microscopical and cultural controls not a single bearer was discovered.

"The question is raised whether, in Indonesia, one or several species of trypanosomes occur in hens ; if all trypanosomes observed in Indonesia are referred to a single species, a wide variability in size appears to exist."

- KRANEVELD, F. C. & MANSJOER, M. Onderzoekingen over bloedparasieten. V. Een *Haemoproteus* en een *Trypanosoma* bij paradijsvogels. [Examinations on Bloodparasites. V. A *Haemoproteus* and a Trypanosome on Birds of Paradise] Reprinted from *Hemera Zoa*. 1951, v. 58, No. 7, 406-14, 1 fig. & 1 graph. [17 refs.]

The English summary appended to the paper is as follows :—

"In 2 birds of paradise (*Diphyllodes respublica* (WILSON's bird of paradise) and *Paradisaea minor* subsp. (minor bird of paradise)) from the Zoological Garden at Surabaya a mixed infection with a *Trypanosoma* and a *Haemoproteus* was found ; though both animals were extremely weakened by a severe coccidiosis, the number of parasites was very limited.

"The rather small trypanosomes were characterized by a short flagellum, a conspicuously large nucleus and the extreme posterior situation of the blepharoplast.

"Several species of birds injected with blood or suspensions of organs did not become infected with the trypanosome."

- WILLS, E. D. Enzyme Inhibition by Suramin and the Measurement of the Isoelectric Points of some Enzymes. *Biochem. J.* 1952, Jan., v. 50, No. 3, 421-5, 4 figs. [24 refs.]

- LITTLE, P. A. & OLESON, J. J. The Cultivation of *Trypanosoma cruzi*. *J. Bacteriology*. 1951, June, v. 61, No. 6, 709-14.

The authors describe two media for the cultivation of *Trypanosoma cruzi*. One is a modification of the fluid medium used by KIDDER and DEWEY (*Proc. Nat. Acad. Sci. U.S.*, 1948, v. 34, 566) for growing ciliates, the other a modification of the semi-solid medium used by HALLMAN *et al.* [this *Bulletin*, 1950, v. 47, 1086] for *Entamoeba histolytica*. The modifications consisted in omitting certain constituents or substituting others for them, and introducing autoclaved erythrocytes on strips of filter paper. These changes resulted in the production of "a nearly chemically defined medium", for the complex composition of which the reader is referred to the original paper. In the new media *T. cruzi* could be propagated continuously, whereas it failed to grow in the original media. C. A. Hoare

CORRÊA, R. R. & SCHIAVI, A. Informes sobre o "*Panstrongylus megistus*", no Estado de São Paulo. Sua presença no litoral. (Hemiptera, Reduviidae.) [Note on *Panstrongylus megistus* in the Coastal Region of the State of São Paulo] *Arquivos de Hig. e Saúde Pública*. S. Paulo. 1951, Sept., v. 16, No. 49, 139-42, 1 map.

The English summary appended to the paper is as follows :—

"During investigations carried out in the State of São Paulo, Brazil, was shown that *Panstrongylus megistus* must be considered as a secondary vector of Chagas' disease. Only 35 specimens were captured and [of 24 dissected] one (4.1%) was found naturally infected with *Trypanosoma cruzi*, in the município of Guaraci on the northern part of the plateau of the State.

"Three specimens of the species were caught on the island of São Sebastião (município de Ilhabela). For the first time a vector of Chagas' disease is found on the sea coast of the State."

PELLEGRINO, J. Transmissores da doença de Chagas no Estado de Minas Gerais. [Vectors of Chagas's Disease in the State of Minas Gerais] *Rev. Assoc. Méd. Minas Gerais*. 1951, May, v. 2, No. 1, 43-66, 3 figs. & 4 folding maps. [36 refs.] English summary.

The author surveyed the available data on the species of triatomids which occur in the State of Minas Gerais, and made a detailed study of the 3 domestic species, *Panstrongylus megistus*, *Triatoma infestans* and *T. sordida*, which are the most important species in the epidemiology of Chagas's disease. The rate of infection with *Trypanosoma cruzi* was also investigated.

Thirteen species of triatomids have been found in Minas Gerais. Out of 42,226 triatomids collected, 14,110 were *P. megistus*, 24,473 were *T. infestans*, and 3,059 were *T. sordida*. The remaining species, and one subspecies, only amounted to 584 insects. *P. megistus* is found in all the geographical zones of the State, while *T. infestans* and *T. sordida* are less widely distributed. The distribution of *T. sordida* to some extent overlaps that of *P. megistus*, and seems to follow the course of large rivers such as the Rio Jequitinhonha, the Rio São Francisco, the Rio das Velhas and the Rio Grande.

The faeces of 26,579 triatomids were examined and 7,631 (28.71 per cent.) were found to be infected with *T. cruzi*. The percentage infection of the 3 important species was : *Panstrongylus megistus*, 33.98 per cent. ; *Triatoma infestans*, 28.12 per cent. ; *Triatoma sordida*, 6.63 per cent.

The data are fully set out in 6 tables and 4 maps. A. J. P. Goodchild

DIAS, E. & CHANDLER, A. C. Human Diseases transmitted by Parasitic Bugs. *Mem. Inst. Oswaldo Cruz*. 1949, Sept.-Dec., v. 47, Nos. 3/4, 423-41. [89 refs.] [Portuguese version 403-22, 11 figs.]

This paper reviews in some detail the literature on transmission of disease by blood-sucking Hemiptera. In dealing with the Cimicidae, their lack of importance as disease vectors is mentioned, but a useful summary is given of those experiments which have shown that bed-bugs are capable of harbouring disease organisms over long periods of time. The bloodsucking Reduviids (Triatominae) and their relation to Chagas's disease (*Trypanosoma cruzi*) are discussed at some length. The aspects dealt with include the relative importance of "domestic" and "wild" triatomid species, the function of wild mammals as reservoirs of infection, the occurrence of local strains of *T. cruzi*, and the

anomalous situation in Mexico and the U.S.A., where infected bugs are common but the human disease is rare or unknown. Clinical details and xenodiagnosis of Chagas's disease are briefly mentioned, with references to reviews of this subject. The suppression of the insect vectors by insecticides, which is so far the only method of prophylaxis, is also mentioned.

Good illustrations are provided (at the end of the Portuguese version), including clinical details of Chagas's disease, typical mud and thatch dwellings where domestic triatomids may be abundant, the principal vector species, with a map of the world distribution of the sub-family Triatominae, and photomicrographs of stages in the development of *T. cruzi* in the intestine of the bug.

A. J. P. Goodchild

THIERMANN, Erica. Consideraciones sobre 1,811 xenodiagnósticos positivos al *Trypanosoma cruzi*, observados en el Departamento de Parasitología. [Study of 1,811 Xenodiagnostic Tests Positive for *Trypanosoma cruzi*] Bol. Informaciones Parasitarias Chilenas. 1951, July-Sept., v. 6, No. 3, 37-9.

The English summary appended to the paper is as follows :—

"A number of 1811 positive results of xenodiagnostics were analyzed in order to find out the optimum time for the examination of the nymphs of *Triatoma infestans* applied to the suspected patient. It is shown, that in 80% of these results the trypanosome was found 30 to 89 days after the appliance of the nymph stages to the person or animal studied, 52·7% after 30 to 59 days and 26·3% after 60 to 89 days of observation."

PÉRA, J. S. O diagnóstico da cardiopatia crônica chagásica. [The Diagnosis of Chronic Heart Disease in *Trypanosoma cruzi* Infection] Rev. Brasileira Med. Rio de Janeiro. 1951, Nov., v. 8, No. 11, 790-96, 10 figs.

Though this brief article contains nothing really new it is a good summary of the subject. Just as rheumatic heart disease may be diagnosed although no definite history of acute rheumatic fever is forthcoming, so chronic cardiopathy in the course of Chagas's disease may be diagnosed with practical certainty although the complement fixation, the Machado-Guerreiro, reaction is negative or cannot be utilized, though this test, when positive, will clinch the diagnosis.

The author's statements are based on an analysis of 22 patients, 12 males and 10 females, of ages ranging between 11 and 50 years, in all of whom the diagnosis was confirmed by a positive c.f. reaction. Details of each patient are presented in two tables which give the occupations, the districts in which the patients lived, their subjective symptoms, the results of examination of the cardiovascular system, the electro-cardiograms and the radiographical findings. Several electrocardiograms are reproduced, but so small or so faintly as to convey the minimum of information; the chief disturbance is irregularity due to extra-systole and, next, to heart-block. The author's conclusions are on what might be called common-sense lines, namely, that in the absence of a positive Machado-Guerreiro reaction chronic heart disease may, with practical certainty, be diagnosed as due to *T. cruzi* infection if the patient comes from a *Triatoma*-infested zone; if he complains of palpitation and effort dyspnoea; if there are extra-systoles confirmed by electrocardiogram, with lowered arterial tension, provided that congenital heart lesions, syphilis and rheumatism as causes of the condition can be excluded.

H. Harold Scott

LEISHMANIASIS

RAGEAU, J. Phlébotomes du Cameroun. [Species of *Phlebotomus* in the Cameroons] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 11/12, 793-800, 8 figs. [26 refs.]

The author made a study of *Phlebotomus* during a period of 2 years in the Cameroons in 1948-1950. He examined 1,366 specimens from 6 different areas and found 10 species, with their varieties. A list of these is shown. Details are given of the 6 areas and the *Phlebotomus* found there, with notes on their habits and distribution. Two of the species are believed to be new (*P. grenieri* and *P. logonensis*) and they are described in detail, with illustrations.

The author considers that only *P. roubaudi*, and possibly *P. schwetzi* and *P. clydei* are clearly anthropophilic. The other species do not appear to be aggressive and have not been seen to bite man. The various species appeared to be less common in the South than the north of the Cameroons.

In the south, the non-biting species play no part in the spread of leishmaniasis, which does not appear to be autochthonous there. In the north, on the other hand, from Garoua to Fort Foreau, 326 cases of cutaneous leishmaniasis were recorded between 1936 and 1946. The disease seems to be seasonal, in the rainy season, and generally affects non-immune persons from the south. *P. roubaudi* appears to be the vector, but this would require to be confirmed in experimental and epidemiological evidence.

H. J. O'D. Burke-Gaffney

QUTUB-UD-DIN, M. The Sandfly Fauna of Kohat-Hangu Valley N.-W.F.P., Pakistan. *Pakistan J. of Health.* 1951, Oct., v. 1, No. 3, 34-6.

The Kohat-Hangu Valley is situated in Kohat District of the North-West Frontier Province. The altitude varies from 3,000 to 4,000 feet above sea-level. It is dry and hot in the summer; cold and humid in the winter with snow and rain. Villagers tether their cattle in the houses and optimum conditions are created for the breeding and feeding of sandflies all the year round. Reports of the occurrence of sandfly fever, oriental sore, and kala azar make the determination of the sandflies of the region of paramount importance.

There is no previous record of the sandfly fauna of the valley and the present paper is based on 187 flies collected between August and December 1949. *Phlebotomus papatasi* formed 50 per cent. of the total. Other species were *Phlebotomus* (*Sergentomyia*) *baillyi*, S.b. var. *campester*, *S. baghdadis*, *S. theodori* and *S. punjabensis*.

H. S. Leeson

WAHBA, E. A. Leishmaniasis of Lids. *Bull. Ophthalm. Soc. Egypt.* 1948, v. 41, 60-62.

Report of a case.

PASCALE, H. Aspectos sanitários do problema da leishmaniose tegumentar americana. [Health Aspects of the Problem of American Dermal Leishmaniasis] *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1951, Sept., v. 16, No. 49, 111-27, 1 fig. & 1 folding map. English summary.

FEVERS OF THE TYPHUS GROUP

BINDE, H., KRAMER, S., PREUSS, G. & WEYER, F. Über einen Fall von Fleck-fieber (Brillsche Krankheit) in Norddeutschland. [A Case of Typhus Fever (Brill's Disease) in North Germany] *Deut. med. Woch.* 1952, Jan. 4, v. 77, No. 1, 5-7, 1 fig. [11 refs.]

This case, which occurred in April, 1951, is said to be the first example of Brill's disease to be reported in Germany.

The patient had an attack of typhus fever in Poland in May, 1944; he had been inoculated against typhus in April 1943. The attack now described was mild, lasting about 12 days. The clinical picture, including the rash, was typical. The Weil-Felix reaction with *Proteus OX19* was positive on the 8th day at a titre of 1-400 and on the 14th day at 1-3,200. A month after the onset the rickettsia-agglutination reaction, determined by Mooser, was positive against *Rickettsia prowazeki* at a titre of 1-320; the titre with *R. mooseri* was 1-80.

John W. D. Megaw

KILLOUGH, J. H. & MAGILL, G. B. Terramycin in Epidemic Typhus, Amebic Dysentery, and Typhoid. *J. Amer. Med. Ass.* 1951, Dec. 29, v. 147, No. 18, 1737-40, 2 figs.

These two members of the U.S. Navy Medical Research Unit describe the following clinical observations from Cairo. Terramycin was administered at 4-hour intervals at the rate of 75 mgm./kgm. body weight per day in 5 cases of epidemic typhus. The response was uniformly good, all the patients recovering, including one described as "moribund" on admission; except in this patient, the temperature fell to normal within 3 days. A dose of 150 mgm./kgm. for 3 days, followed by 75 mgm./kgm., was given to 7 patients with amoebic dysentery. The immediate response was satisfactory, but 1 patient developed an hepatic abscess (successfully treated with chloroquine) while taking terramycin and 2 had recurrences; 2 have remained apparently cured for 3 months and 2 are still under observation. Doses varying from 75 to 125 mgm./kgm. were given in 5 cases of typhoid fever. Three appeared to respond, becoming afebrile in an average of $4\frac{1}{2}$ days: in the other 2 fever continued for 15 and 22 days, and in the second of these chloramphenicol was substituted, with an immediate response. There were no relapses. The last-named patient had typhoid bacilli in his faeces 2 months later; those treated with terramycin only ceased to excrete bacilli. L. P. Garrod

DAVIS, D. E. Observations on Rat Ectoparasites and Typhus Fever in San Antonio, Texas. *Pub. Health Rep.* Wash. 1951, Dec. 28, v. 66, No. 52, 1717-26.

A detailed survey was made of the ectoparasites found on commensal rats in San Antonio, Texas, from May, 1944, to September, 1945. The most common fleas were *Xenopsylla cheopis* with a period of maximum incidence in May to August, and *Leptopsylla segnis* which was most abundant in March and April and almost absent in July and August.

The season of high prevalence of flea-borne typhus was July to October so there was a lag of about 2 months between the rise in numbers of *X. cheopis* and the onset of the typhus season.

Details of the seasonal incidence of the other fleas are not given; their numbers varied greatly according to the type of premises in which the rats were trapped or were so small as to be insignificant.

Rattus norvegicus was more heavily infested than *R. rattus*.

Two species of mites were found in considerable numbers: *Liponyssus bacoti*, most abundant in March and April, and *Laelaps nuttalli*, most abundant in July and August. The rat louse, *Polyplax spinulosa*, was most common in December, January and February.

Larger average numbers of fleas were found on rats with positive fixation reactions for flea-borne typhus than on those with negative reactions.

[Medical entomologists will find a great deal of interesting detailed information in the paper.]

John W. D. Megaw

SILVA GOYTIA, R. Rickettsiasis en México. [**Rickettsial Disease in Mexico**] *Medicina. Mexico*. 1952, Jan. 10, v. 32, No. 643, 1-7. [48 refs.]

A general review and discussion of the literature.

SCOTT, J. A. & BLYNN, Ellen. **Observations on Characters for identifying the Developmental Stages and for determining the Sex of Live Tropical Rat Mites.** *J. Parasitology*. 1951, Dec., v. 37, No. 6, 519-24, 21 figs. on pl.

LE GAC, P., GIROUD, P. & BAUP, G. L'escarre d'inoculation de la rickettsiose vésiculeuse africaine. [**The Inoculation Eschar of African Vesicular Rickettsiosis**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 11/12, 729-30.

The authors have already described the occurrence in Oubangui-Chari of a disease which they call vesicular rickettsiosis [this *Bulletin*, 1952, v. 49, 35] and identify with rickettsialpox, a rickettsial fever hitherto reported only from New York and Boston.

They describe the primary lesion as an oval or rounded papule having a diameter of 20 to 30 mm. There is a central vesicle which soon dries up and is replaced by a blackish crust identical with the *tache noire* of boutonneuse fever. The crust falls off in about 8 days leaving a punched-out ulcer which heals in about 6 weeks. An eschar was excised on the 25th day. Its histology, as described by Dr. BABLET of the Pasteur Institute of Paris, indicates that it is a rickettsial lesion closely related to that of boutonneuse fever, with which the disease has antigenic affinities.

John W. D. Megaw

MARTIN, R. & MAROGER, F. Premier cas à Paris de fièvre boutonneuse autochtone. [**First Autochthonous Case of Boutonneuse Fever in Paris**] *Bull. Acad. Nat. Méd.* 1952, v. 136, Nos. 1/2, 13-15.

PHILIP, C. B. & KOHLS, G. M. **Elk, Winter Ticks, and Rocky Mountain Spotted Fever: a Query.** *Pub. Health Rep. Wash.* 1951, Dec. 14, v. 66, No. 50, 1672-5.

A case, believed to be of Rocky Mountain spotted fever, occurred 3 days after the removal of a tick which had attached itself to the patient while he was skinning an elk heavily infested with ticks. The tick was not available for identification but there was reason to believe that it was "probably the winter tick *Dermacentor albipictus*" which is regarded as a "one-host tick".

The author states that some of the original transmission experiments by Ricketts in 1907 were made with this species of tick.

The query referred to in the title of the paper is: where did the tick get its infection?

John W. D. Megaw

LOPES, A. La febbre Q nelle isole Eolie. Studio epidemiologico. [**Q Fever in the Aeolian Islands**] *Ann. d. San. Pubblica.* Rome. 1951, Sept.-Oct., v. 12, No. 5, 1891-908, 2 figs. [55 refs.] English summary (9 lines).

This is a detailed description of the epidemiological conditions associated with an outbreak of Q fever in the island of Lipari during the first four months of 1950. The source of infection was believed to be flocks of goats which daily passed through the streets of the affected towns; a large percentage of the goats gave positive reactions with the complement-fixation test.

Among 33 persons living in streets traversed by the goats 18 had fixation titres of 1-16 to 1-1,024 and among 21 persons living in other streets only one reacted, at 1-16.

A surprising finding was that among the 31 persons engaged in tending the animals and distributing their milk only one gave a positive reaction, at the low titre of 1-8, whereas among 45 persons engaged in domestic duties 16 reacted at titres of 1-8 to 1-512. Although very few clinically obvious cases occurred among children, 7 out of 22 who were tested reacted at 1-8 to 1-256. There was evidence of the existence of immunity in a large proportion of the population, many of whom had presumably suffered from sub-clinical attacks.

John W. D. Megaw

IRONS, J. V., EADS, R. B., JOHNSON, C. W., WALKER, O. L. & NORRIS, Margaret A. **Southwest Texas Q Fever Studies.** *J. Parasitology.* 1952, Feb., v. 38, No. 1, 1-5.

"Q fever studies were conducted in Zavala County, Texas, March 1950 to February 1951 in an area in which the disease was shown to be prevalent. A total of 2,261 animals, representing 8 orders, 16 families and 28 species, were examined for ectoparasites and bled for serological studies. Thirty four species of ectoparasites, totalling 9,320 specimens, were taken as listed. The ectoparasites were pooled by species and inoculated into laboratory animals. All of the pools were negative during the study period on which this report is based.

"Complement-fixing titers have been shown in pack rat (*Neotoma micropus*) sera.

"*Ornithodoros talaje* ticks allowed to feed on experimentally infected pack rats acquired the infection between the 6th and 11th day after inoculation of the rodents.

"Two cows from the 'W.' dairy were shown to be shedding *Coxiella burnetii* in their milk during the year on which this report is based."

SIEGERT, R., PETER, H., SIMROCK, W. & SCHWEINSBERG, H. Q-Fieber-Studien. I. Mitteilung. Herstellung und Auswertung diagnostischer Antigene. [**Q Fever Studies: The Preparation and Employment of Diagnostic Antigens**] *Zent. f. Bakt.* I. Abt. Orig. 1951, Oct. 31, v. 157, No. 5, 309-25, 4 figs. [31 refs.]

Full details are given of the methods adopted by the authors in the preparation of Q fever antigens for diagnostic purposes.

The antigens were prepared from yolk-sac cultures by a method based on the techniques described by CRAIGIE, TOPPING and SHEPHARD and other workers. The antigen was found equal to American [Lederle] commercial antigens for use in the complement-fixation and rickettsia-agglutination

tests. The two strains of *Rickettsia burneti* from which the antigens were prepared were the Henzerling and a "Zurich" strain; these gave almost identical reactions when tested against the same sera. *John W. D. Megaw*

HERZBERG, K. & URBACH, H., with Gertrud LÜCK & Erika HARTMANN-HEYN. Untersuchungen mit europäischen Q-Fieber-Antigenen. III. Mitteilung. [A Study of European Q Fever Antigens] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1952, Jan. 3, v. 109, No. 2, 159-76. [21 refs.]

[This is the third, and last, of a series of three papers in which the author describes the results of his study of the antigens of various European strains of *Rickettsia burneti*. The previous papers were reviewed in this *Bulletin*, 1951, v. 48, 885 and 1952, v. 49, 40.]

In the present article the authors describe the results of complement-fixation and rickettsia-agglutination tests of the sera of guineapigs inoculated with different strains of *R. burneti*; the findings corroborate those obtained with the sera of patients. The Mediterranean strains differ considerably from the South-German strains in their complement-fixing and agglutinating antigens. The complement-fixing antibodies were found superior to the agglutinating in giving higher titre and more prolonged reactions but curious anomalies were observed at times; for example higher-titre fixation reactions were sometimes given with heterologous than with homologous antigens; agglutination reactions occasionally occurred much earlier than the fixation responses, and there was a case in which the agglutination reaction remained completely negative for 10 weeks though the complement-fixation titre rose to 1-640.

The agglutination test is said to have one great virtue; no false positive was ever observed when the titre rose to 1-20 or over.

The findings described in this and the previous two papers are discussed in the light of the reports on the subject by American workers. The three papers form an important contribution to the literature of the subject; the last is of special value in providing a concise summary of what has been done by other workers in the same field. *John W. D. Megaw*

LENNETTE, E. H., CLARK, W. H. & JENSEN, Florence W. **Q Fever Studies. XII. Certain Observations on the Relationships between Serologic Tests for Brucellosis, Syphilis and Q Fever.** *Amer. J. Pub. Health.* 1952, Jan., v. 42, No. 1, 12-19, 1 fig.

Among 451 persons who had positive complement-fixation reactions for Q fever only one reacted with the agglutination test for brucellosis. Out of 38 persons who reacted for brucellosis there was only one who reacted for Q fever and his titre was 1-16; he was a dairy worker living in an area in which Q fever was known to be endemic.

Among 1,087 persons who were negative for a pre-marital test for syphilis 12 reacted with Q fever antigens; only one of these had a titre over 1-16. In two groups of persons, totalling 1,039, who gave positive reactions for syphilis 5 reacted with Q fever antigens and 3 of these had titres over 1-16. These figures show that false positive reactions for Q fever do not occur because of syphilitic infection.

Among 427 persons ill with Q fever there were 32 who gave positive reactions (3+ or 4+) with the Kolmer test for syphilis at some stage of the illness. It was not possible to test each of these at every stage, but the figures given in the table show how many of the 32 were tested during successive periods of 2 weeks after the onset and how many were positive at each stage. All but one had become negative by the 11th week.

Results of tests of 32 Q fever patients who gave positive reactions with the

Kolmer test for syphilis

| | | | | | | |
|------------------|-----|-----|-----|-----|------|------------|
| Weeks of illness | ... | 1-2 | 3-4 | 5-6 | 7-10 | 11 or more |
| Number tested | ... | 14 | 28 | 20 | 11 | 11 |
| Number positive | ... | 2 | 24 | 10 | 3 | 1 |

(Kolmer test)

The figures show that in general the false-positive reaction appeared during the 3rd or 4th weeks of the illness and had disappeared by about the 11th week. In none of the 32 patients was there any reason to suspect syphilitic infection.

John W. D. Megaw

VICTOR, J., RAYMOND, Ruth, VALLIANT, Jeanne, WAGNER, J. C. & POLLACK, A. D. **Studies on Opsonins in Q Fever.** *J. Exper. Med.* 1952, Jan. 1, v. 95, No. 1, 61-70, 2 figs.

The authors state that some of them have already described, in articles still in the Press, a quantitative method for determining the opsonins for *Brucella*. The method shows that in brucellosis the opsonins may increase up to 10 million times their normal amount. By the method now described it has been shown that similar increases occur in the opsonins for *Coxiella* [*Rickettsia*] *burneti* in cases of Q fever.

The standard adopted is the occurrence of phagocytosis in 94 per cent. or over of the neutrophiles kept in contact with suspensions of *C. burneti* to which various dilutions of the patients' sera have been added. Readings are made from stained smears of suspensions after being kept in a state of agitation for 30 minutes. The neutrophiles are obtained from the patients' or animals' blood. By the above standard and in the conditions described there were only 1.0 per cent. of (presumably false) positives in tests of normal sera; there were 30 per cent. of positives in sera of persons immunized by vaccines and 31 per cent. in sera from "normal" persons living in Los Angeles where Q fever was endemic. The last percentage was 7 times higher than that of positive reactions with the complement-fixation test, but every person who had complement-fixing antibodies reacted also with the opsonin test.

Among persons ill with, or recovered from, Q fever, the opsonin reaction was always positive; in those actually ill the titre ranged from 10^3 to greater than 10^7 with the patients' own washed neutrophiles so that the test is extraordinarily sensitive. The method is claimed to be convenient and easy but the detailed description suggests that a high degree of technical skill will be needed. It is to be hoped that the test will be applied to other rickettsial fevers.

John W. D. Megaw

HAAS, R. Über eine Mikroagglutinationsreaktion für die Serodiagnose des Q-Fiebers. [**A Microagglutination Reaction for the Serodiagnosis of Q Fever**] *Klin. Woch.* 1952, Jan. 15, v. 30, Nos. 3/4, 80-82, 1 fig.

A slide-agglutination test is described in which hanging-drop preparations of mixtures of serum and antigen are kept at 37°C. for 2 hours and then examined with a microscope fitted with a dark-background condenser of the non-immersion type. A further reading is made after keeping the preparation overnight at room temperature. Two dilutions are made: 1-10 and 1-80. Slides with large hollow-ground recesses are used and evaporation of the hanging drops is prevented by ringing the recesses with Vaseline.

Photographs show the sharp contrast between positive and negative reactions. Economy in the consumption of the costly antigens and simplicity combined with reliability are claimed as advantages of the method.

John W. D. Megaw

ORMSBEE, R. A. **A Biochemical Study of Experimental Q Fever Infection in the Bovine Mammary Gland.** *Pub. Health Rep.* Wash. 1951, Dec. 21, v. 66, No. 51, 1685-93.

"1. The injection of infectious suspensions of *C. burneti* in the udders of cows resulted in the following changes in the composition of their milk: increases in total nitrogen, noncasein nitrogen, chloride, butterfat, nonfat solids, and pH; decreases in casein, lactose, milk volume, and water. No change in blood hemoglobin resulted.

"2. Major fluctuations in these constituents disappeared within 8 days following injection.

"3. Similar changes occurred in control animals injected with chick yolk-sac suspension, but the changes were of smaller magnitude and disappeared more quickly.

"4. The changes are different from those that occur with chronic bacterial mastitis in that the butterfat and nonfat solids increased in concentration."

YELLOW FEVER

BENITEZ ARMAS, S. El pasado y el presente de la fiebre amarilla en México. [Yellow Fever in Mexico, Past and Present] *Medicina.* México. 1951, Nov. 25, v. 31, No. 640, 451-5.

LUMSDEN, W. H. R. **The Crepuscular Biting Activity of Insects in the Forest Canopy in Bwamba, Uganda. A Study in relation to the Sylvan Epidemiology of Yellow Fever.** *Bull. Entom. Res.* 1952, Jan., v. 42, Pt. 4, 721-60, 6 figs. [28 refs.]

This work was carried out at Mongiro on the edge of the Semliki Forest, Uganda, between February 1948 and March 1949. Five tree platforms were used, the bait on each platform being 3 African children who caught in test-tubes all the insects alighting on one another; they deposited the tubes containing their captures in bags which were numbered according to the different catching periods. The catching periods were limited to 3 hours before and 3 hours after sunset. Over the critical intervals between half an hour before and one hour after sunset, the catches were divided into 10-minutes periods. As the time of sunset varied with the seasons clocks were adjusted to a special "catch time" which bore a constant relationship to sunset. By this arrangement sunset always coincided with 18.00 hours and with the completion of the collecting bag number 6 and the beginning of bag number 7. In this account the author analyses the catches made on 100 evenings when all 5 platforms were in use. Most monkeys take up their sleeping positions in the trees by sunset so these insect catches are of importance in considering the transmission of yellow fever virus among forest monkeys.

The total number of biting insects caught was 5,889, of which 5,686 were identified as belonging to 34 species while the remaining 203 were all unidentified species of *Culex*. There were 5 species of *Anopheles*, 23 culicine mosquitoes,

6 Tabanidae and 1 *Glossina*. Eight of the species were noticeably abundant, *Anopheles gambiae*, 1,771; *Taeniorhynchus fuscopennatus*, 191; *T. africanus*, 428; *T. uniformis*, 169; *Aedes nigerrimus*, 126; *Aedes apicoargenteus*, 132; *Aedes africanus*, 841; and *Chrysops centurionis*, 1,946. There were significant differences between the catches of 6 of the 8 abundant species on the 5 separate platforms; *A. gambiae*, *T. africanus* and *T. uniformis* were derived largely from breeding places outside the forest while *Aedes apicoargenteus*, *Aedes africanus* and *Chrysops centurionis* bred inside the forest and the number of a species at one platform depended largely on the local population which, in turn, depended on the proximity and abundance of its breeding places.

Seasonal variations in numbers were almost certainly related to the amount and distribution of rainfall; the reduction in the numbers of *Aedes africanus* during the dry season must be regarded as of importance in relation to the survival of the yellow fever virus in the forest. This reduction is a true one and is not simply an effect of variation in activity. There appeared to be two groups of *Chrysops centurionis*, one biting before and the other after sunset; this may be due to the presence of insects of different ages. Cloud and rain seemed to be without effect on *A. gambiae* but wind diminished the catch. Wind and rain diminished the catch of *Aedes africanus* but none of these elements showed any significant association with the size of the catch of *Chrysops centurionis*.

The peak period of activity of a species was usually well defined and was subject to only slight movement in time in relation to sunset. In the most numerous species the peak occurred shortly after sunset; this was followed by a fall in activity to moderate or low levels. The fall was not due to any increasing difficulty in collecting as the daylight faded and was replaced by artificial light. The remarkable regularity of the peak is more likely to be related to light rather than to temperature or humidity. Onset of the main activity in *A. gambiae*, *Aedes africanus* and *Chrysops centurionis* tended to be later on moonlit than on moonless nights.

The peaks of biting activity may be explained as follows: daylight inhibits activity and there is, during the daytime, an accumulation of hungry individuals. As the daylight fades the insects are released into activity, pass to the bait and cause the peaks observed shortly after sunset. Individuals biting later were those not ready to feed so soon. In mosquitoes, and probably in *Chrysops* also, the first blood meal is preceded by mating.

It is suggested that the peak period of biting activity is sufficiently characteristic to provide a marker for future studies, though it has certain disadvantages which are indicated. Also, the ages of the mosquitoes coming to feed should be estimated by ovarian examination, and dissection of the salivary glands of *Anopheles* species should yield valuable information, for the most dangerous time for infection with malaria may not be when biting activity is at its maximum, if most of the mosquitoes are feeding for the first time.

H. S. Leeson

DICK, G. W. A. **Further Studies on the Susceptibility of African Wild Animals to Yellow Fever.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Jan., v. 46, No. 1, 47-58. [14 refs.]

The author has tested the susceptibility of certain East African mammals other than primates, to yellow fever virus. Two strains of this virus were used, the Asibi strain constantly maintained in monkeys, and a strain isolated from mosquitoes in Uganda. For antibody studies the French neurotropic strain was used.

Seven hedgehogs, *Atelerix pruneri hindei*, were tested and were found to be highly susceptible, circulating virus being present for about a week in all those which survived up to 10 days after inoculation. In addition neutralizing antibody was developed in the four which were alive on the 10th day. Ten shrews belonging to four different species of *Crocidura* were tested and gave uniformly negative results.

The only other species considered as a possible source of infection to an arthropod vector is the genet, *Genetta tigrina stuhlmanni*. Six examples were inoculated subcutaneously, and the three given large doses showed circulating virus for 4 to 5 days and also developed neutralizing antibody. The others were negative. Fourteen palm civets, *Nandinia binotata arborea*, were tested and in some cases circulated a trace of virus and developed antibody which, however, soon disappeared. Single examples of the white-tailed mongoose, *Ichneumia albicauda ibeana*; African wild cat, *Felis lybica ugandae*; honey badger, *Mellivora capensis*; squirrel, *Heliosciurus rufrobrachium*, and an East African civet, *Civettictis civetta schwarzi*, gave uniformly negative results.

E. Hindle

CAUSEY, O. R. & DOS SANTOS, G. V. **Diurnal Mosquitoes in an Area of Small Residual Forests in Brazil.** *Ann. Entom. Soc. of America.* 1949, v. 42, No. 4, 471-82, 5 figs. [Summary taken from *Rev. Applied Entom.* Ser. B. 1951, Dec., v. 39, Pt. 12, 210.]

The following is virtually the authors' summary. Observations on diurnal mosquitoes in residual forests in the region of Passos, Minas Gerais, were undertaken as a part of a study of a region that had been invaded by jungle yellow fever ten years previously. Mosquitoes were collected on human bait at ground and tree-platform levels at four stations in four different forests, during four days a week over a continuous period of 120 weeks. Hourly, weekly, monthly and seasonal records were made. Parallel meteorological data were assembled. Of the total of 73,321 mosquitoes, 9,788 were *Haemagogus spegazzinii* Br  th., which was the only species of *Haemagogus*. The highest monthly rate per man hour was 17.1 for all mosquitoes and 5.0 for *H. spegazzinii* in January, 1946. *H. spegazzinii* and other tree-hole breeders were fewer in number during the second rainy season, and showed evidence of being still further reduced during the first half of the third wet season, when this study was terminated. This may indicate that there exists a cycle of several years' duration in the *Haemagogus* population in addition to the usual seasonal cycle, and that these studies were undertaken on the low side of this large cycle.

DENGUE AND ALLIED FEVERS

SABIN, A. B. **Experimental Studies on Phlebotomus (Pappataci, Sandfly) Fever during World War II.** *Arch. f. d. gesamte Virusforschung.* 1951, Oct. 19, v. 4, No. 4, 367-410, 7 figs. [22 refs.]

Much of the work described in this paper has already been the subject of a report [see this *Bulletin*, 1944, v. 41, 1031]. The further studies carried out in the U.S.A. have confirmed and extended the previous findings.

Attempts to transmit the virus of sandfly fever by *A  des aegypti* were unsuccessful in 6 cases in which susceptible persons were bitten by large numbers of the insects at suitable intervals after feeding on infected volunteers on the first day of the illness. In another case a patient who had suffered from dengue in Hawaii 18 weeks previously was found susceptible to inoculation

with sandfly fever. Four persons who had been attacked with sandfly fever were found susceptible to dengue a few weeks later—8–10 weeks in three of the cases. These findings are regarded as showing that sandfly fever and dengue are antigenically distinct diseases, each of which is transmitted by a special vector.

An interesting finding was that a strain of sandfly virus found in Naples did not immunize against inoculation with the Middle-East strains though it caused a disease clinically typical of sandfly fever. The existence of strains which do not immunize against each other may account for some of the cases in which second attacks occur after a short interval. *John W. D. Megaw*

RABIES

DE VRIES, E. & VAN WERMESKERKEN, W. M. Hondsdolheid bij een uit Indonesië gerepatrieerde militair. [**Rabies in a Soldier Repatriated from Indonesia**] *Nederl. Tijdschr. v. Geneesk.* 1952, Feb. 16, v. 96 (i), No. 7, 374–8, 2 figs. on pl.

The English summary appended to the paper is as follows :—

“ A soldier fell ill with rabies seven months after returning from Indonesia. Infection in Holland is considered impossible, no rabid dogs being known there, while in Indonesia rabies is endemic. History and pathology are given and discussed. Control measures were taken.”

VEERARAGHAVAN, N. **A Note on the Occurrence of Negri Bodies.** *Indian J. Med. Res.* 1951, Apr., v. 39, No. 2, 261–5.

The author presents some observations which he considers demonstrate the site of election of Negri bodies in rabies. The study is based on the examination of portions of brains of 2 human beings, 97 dogs and one donkey which had been naturally infected, 300 guineapigs and 25 rabbits dying after inoculations with “ street ” virus, and of 20 guineapigs which had been inoculated with rabbit “ fixed ” virus, and 150 guineapigs and 10 rabbits which had received anti-rabic treatment. He concludes that while his findings indicate that the hippocampus major appeared to be the site of election of Negri bodies in natural infections, nevertheless an examination of hippocampus, mid-brain and cerebellum may reduce the number of inconclusive results. In experimental rabies with the use of “ street ” virus, the mid-brain at the level of the oculomotor nucleus was markedly superior to the hippocampus or the cerebellum, as the site of election for Negri bodies, while in some guineapigs which died of infection with rabbit-fixed virus a few Negri bodies were demonstrable in the mid-brain, but were not found in the hippocampus or cerebellum. The Negri bodies were fewer in number and smaller in size in the brains of animals treated with 5 per cent. phenol vaccine. [This paper represents a great deal of work involving an enormous number of animals. While it is usually not possible to select the material from natural infections, it would seem that conclusive results on the distribution of Negri bodies can only be obtained by the examination of serial sections from all areas of the brain. In the studies of the experimental rabies brains, it is felt that a more convincing picture

of the distribution of Negri bodies would have been obtained from the examination of serial sections of a few brains covering a larger area, employing some quantitative method for estimating frequency of occurrence.]

G. W. A. Dick

GAYOT, G., CHOQUETTE, L. P. E. & POUL, J. Essai de traitement de la rage à virus fixe par l'aureomycine (échec). [**Attempts to Treat Fixed-Virus Rabies with Aureomycin, without Success**] *Arch. Inst. Pasteur d'Algérie*. 1951, Dec., v. 29, No. 4, 298-9.

The following is a translation of the authors' summary :—

Aureomycin, the rabicidal effect of which on fixed virus has been shown *in vitro*, by P. REMLINGER and J. BAILLY, seems to have no curative action *in vivo* whether it is given from the time of appearance of signs of rabies or 24 hours later.

These results confirm the opinions of Remlinger and Bailly, namely "from the practical point of view, there is nothing to be expected from aureomycin for the preventive and, *a fortiori*, the curative treatment of rabies", and also the equally negative experiments of Z. BERKE and A. CILESIZ, who used aureomycin orally or intracerebrally.

H. J. O'D. Burke-Gaffney

CILLI, V. Rassegna delle attività svolte dall'Istituto Vaccinogeno Zooprofilattico di Asmara dal 1936 al 1947. Studi e ricerche di patologia tropicale veterinaria. [**Report of the Asmara Institute for Animal Vaccines for the Years 1936-1947**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1951, Sept., v. 32, No. 9, 833-912, 12 figs. [Refs. in footnotes.] Continued from July, number.

The section of this report which deals with rabies vaccines (pp. 851-868) states that the Institute produces 4 types of such vaccines.

Carbolized killed vaccine for use in man is a 6 per cent. emulsion of fixed virus, obtained from the central nervous system of a rabbit which has been inoculated intradurally and killed on the 6th day, kept in 1 per cent. carbolic solution at 37°C. for 24 hours. This vaccine can be issued for use in out-stations and is given to adults in courses of 20, 25 or 30 injections of 4 cc. per dose, according to risk incurred dependent on the severity and sites of the bite or other injury in each case.

Altogether 51,025 phials have been issued, equivalent to about 2,170 courses of treatment. There has been no case of rabies or of post-vaccinal paralysis among those receiving this prophylactic treatment.

Carbolized vaccine for graduated use in man is made like the previous preparation except that it is not exposed to a temperature of 37°C. but it is kept at the ordinary (Asmara) room temperature of 20-22°C. for 1, 2, 3, 4 or 5 days to give different degrees of attenuation. Two forms of treatment course are recommended according to severity and type of bite and the inoculations are nearly always given at the anti-rabies dispensary in Asmara. A total of 26,222 phials have been issued, equivalent to 1,500 courses of treatment. There have been three cases of post-vaccinal paralysis, of which one was fatal, but no case of rabies, following the graduated prophylactic treatment.

Two other forms of anti-rabies vaccines are issued by the Institute for veterinary use.

Rabies has been demonstrated in 141 out of 317 dogs, 2 out of 3 cattle, 1 out of 3 horses, 2 out of 18 monkeys and 2 out of 3 human cases examined in the Institute.

J. Cauchi

TRAUB, F. B., FRIEDEMANN, U., BRASCH, A. & HUBER, W., with the technical assistance of Helen KAPLAN. **High Intensity Electrons as a Tool for Preparation of Vaccines. I. Preparation of Rabies Vaccine.** *J. Immunology.* 1951, Nov., v. 67, No. 5, 379-84. [15 refs.]

Five per cent. NYC fixed rabies virus mouse brain suspended in 10 per cent. normal horse serum or broth served as basis for the rabies vaccine. The suspension was filled into translucent polyethylene bags and deep-frozen on dry ice. High-intensity electron radiation from a capacitron was applied to the material, which was kept continuously on dry ice.

US standard control methods for testing antigenicity and effective inactivation were used throughout.

For comparative purposes phenol-inactivated vaccines were prepared from the same batches. They showed on the average a ten-fold lower protective value.

8.5×10^5 REP (roentgen equivalent physical) regularly inactivated the virus. The PD_{50} values varied between 10,000 and 148,000, showing a rough correlation with the original infectivity titre. These values were obtained after challenge with the heterologous NIH standard virus.

Vaccines prepared in the same way from the supernatant of a 5 per cent. brain suspension following low speed centrifugation gave approximately one logarithm less in protective titre.

Only an insignificant reduction of antigenicity occurred over a four-fold range of irradiation intensity, the maximum being 9 times the minimal inactivating dose.

The keeping qualities of the vaccine appeared to be good; one sample, tested after 6 months storage at 4°C., showed no loss of potency.

In order to justify the use of their method over ultraviolet [uv] inactivation, which latter method gives equally potent vaccines and is more easily applicable, the authors put forward the following arguments:

- (1) Easy over-irradiation with uv.
- (2) Limited penetrating force of uv, particularly in opaque solutions.
- (3) Impossibility of uv irradiation in the frozen state.
- (4) Better preservation of proteins and enzymes if inactivation takes place in the deep-frozen state.
- (5) No possibility of photo-reactivation.
- (6) As bacteria are more susceptible to high velocity electrons than viruses all preparations are automatically rendered sterile, this sensitivity range being the reverse for uv light.
- (7) Electrons can be generated at velocities permitting the penetration of all kinds of containers.

C. Klimt

KOPROWSKI, H., VAN DER SCHEER, J. & BLACK, J. **Use of Hyperimmune Antirabies Serum Concentrates in Experimental Rabies.** Reprinted from *Amer. J. Med.* 1950, Apr., v. 8, No. 4, 412-20. [22 refs.]

Rabbit or sheep hyperimmune serum was obtained by repeated injections with Flury strain chick embryo virus and brain tissue infected with fixed rabies virus. The gamma-globulin fraction of the serum was concentrated by either sodium sulphate or methanol precipitation and adjusted to 7 per cent. protein content.

NYC canine salivary gland street virus was used for challenge purposes. Comparative titration in hamsters injected in the leg muscle and the masseter muscles respectively and mice injected intracerebrally demonstrated that the

intramasseter route of injection in hamsters gave comparable results to mice injected intracerebrally.

Two-fold dilutions of 1 ml. antiserum concentrate given subcutaneously to hamsters 24 hours after challenge with 40 LD₅₀ gave a PD₅₀ titre at 1/24 serum dilution. Phenolized vaccine given daily for 14 days, commencing 24 hours after challenge, afforded no protection whatsoever.

Undiluted serum, given as late as 72 hours post-infectiously, still protected 50 per cent. of the hamsters. Additional vaccination seemed to exert neither a favourable nor a detrimental effect. [The value of one experiment is diminished as only 80 per cent. of the controls contracted rabies.]

In guineapigs the serum again showed good protection, while vaccine alone showed none. Serum and vaccine treatment combined seemed somewhat superior to serum alone. No protection was demonstrable when serum was given later than 72 hours after exposure.

Calculation on a weight-protective value basis led to a preliminary recommendation of 0.5 ml. per kilogramme body weight for human use.

Twenty human beings, 7 of whom could be proved to have been exposed to rabies, have so far been successfully treated with antiserum. All of them but one were also given subsequently some kind of vaccine treatment. Two of them deserve special attention: a laboratory attendant was severely bitten on the palm of his hand by a guineapig, the salivary gland of which was found to have an LD₅₀ street virus titre of 10^{-4.5}. He received 1.5 ml. antiserum per kgm. bodyweight 4 hours after exposure and 24 hours later a 7-day vaccination course was initiated. He was symptomless six months later.

Another accidental laboratory exposure afforded the unique opportunity to study the antibody response following antiserum treatment and subsequent vaccination. A high titre was maintained throughout the tested period (1-30 days). No interference between passive and active immunity was observed. Five persons who received the vaccination course only showed considerably lower and much delayed antibody responses.

For use in human beings the authors recommend hyperimmune serum to be followed by a shortened course of vaccination, thus rendering optimal protection against infections with a short as well as those with a long incubation period and simultaneously reducing the risk of post-vaccinal paralysis. *C. Klimt*

ARCH. INST. PASTEUR D'ALGÉRIE. 1951, Dec., v. 29, No. 4, 308-15. Quelques notions élémentaires sur la rage. [**Some Elementary Observations on Rabies**] (Tract No. 68. 2nd Edition, Sept. 1951.)

This short monograph gives simple notes on the nature and control of rabies, together with relevant extracts from the Algerian legislation.

DIVO, A., GOLDMAN, C. & LUGO, A. La enfermedad de Aujeszky (seudorrabia) en Venezuela. [**Aujeszky's Disease (Pseudorabies) in Venezuela**] *Bol. Inst. Invest. Vet.* Caracas. 1951, Mar., v. 4, No. 18, 599-616, 2 figs. on 2 pls. [22 refs.]

The English summary appended to the paper is as follows:—

- "1. Two cases of a disease subsequently identified as pseudorabies are reported in a Cocker Spaniel and a German Shepherd born in this country.
- "2. Rabbits, guinea pigs, and mice were inoculated with an emulsion of brain material from the German Shepherd dog. Success was achieved in provoking the disease experimentally, and its causative agent was isolated. The observed symptoms are reported.

" 3. Test animals receiving the material filtered through an EK-Seitz pad became ill and died, while the ones receiving the Berkefeld-N filtrate remained unharmed.

" 4. The results obtained by inoculation of the virus on test into laboratory and other animals paralleled those observed in connection with Aujeszky virus.

" 5. Cross neutralization of the virus under examination by Aujeszky immune serum and of Aujeszky virus by immune serum from the isolated virus allowed to establish the immunological identity of both these viruses.

" 6. The existence of pseudorabies in native swine was established by means of the serological diagnosis."

PLAGUE

DE MOURA, S. A. L. & REMIÃO, M. S. Cinco anos de Laboratório de Peste. [**Five Years' Records of the Plague Laboratory**] *Rev. Inst. Adolfo Lutz*. São Paulo. 1945, Dec., v. 5, No. 2, 375-88.

HILLS, G. M. & SPURR, E. D. **The Effect of Temperature on the Nutritional Requirements of *Pasteurella pestis***. *J. General Microbiol.* 1952, Feb., v. 6, Nos. 1/2, 64-73, 7 figs. [21 refs.]

" The nutrition of three virulent and three avirulent strains of *Pasteurella pestis* has been studied at temperatures between 23 and 37° on a basal medium containing glucose, ammonium and other inorganic salts. The organism has considerable synthetic powers and the distinction between essential nutrients and non-specific stimulants of growth is not always definite. At 32° and below, the optimal medium contained phenylalanine, valine, isoleucine, cysteine, methionine and haemin. Five out of the six strains utilized leucine in place of valine, but the maximum count was then delayed. At 36° the optimal medium contained in addition, alanine, leucine, serine, threonine, biotin and pantothenate. Omission of alanine or leucine delayed growth without reducing the maximum population. When biotin and pantothenate were omitted the organism required a mixture of twenty amino-acids."

BLANC, F. & MARTIN, M. Le traitement de la peste. [**The Treatment of Plague**] *Arch. Méd. Gén. et Trop.* 1951, July-Aug., v. 28, No. 4, 183-8.

A general description.

GROSS, B., BAKER, R. H. & BONNET, D. D. **Use of Warfarin-treated Oats as a Plague Suppressive Measure in Hawaii**. *Pub. Health Rep.* Wash. 1951, Dec. 28, v. 66, No. 52, 1727-33, 2 figs.

" Warfarin " is a lethal anti-coagulant chemical discovered by Dr. K. P. LINK *et al.* at the Wisconsin Alumni Research Foundation ; it is 3(alpha-phenyl-beta-acetyl-ethyl)-4- hydroxycoumarin ; it was present in the poisoned rolled oats to the amount, by weight, of 0.925 per cent. with 11.0 per cent. mineral oil, 0.25 per cent. of para-nitro-phenol (a mould deterrent), and oats, 88.73 per cent.

The object of the experiment was to determine the value of the poisoned bait as a plague suppressive measure in field areas in Hawaii heavily infested with *Rattus alexandrinus* and *R. hawaiiensis*, moderately infested with *R. norvegicus* and having very few *R. rattus*.

The test area consisted of 78 acres of mature sugar cane with 60 acres of interspersed waste land. The first step was to lay down 200 snap traps at intervals of 35-50 feet in the area and to examine the traps daily for a week to estimate the rodent population. Then the traps were removed and were replaced by bait pans, each of which contained 4 oz. warfarin-treated oats. Each bait was visited every 3 to 5 days, and replenished when necessary, over a period of 91 days. The baits were then removed and trapping was resumed for 4 weeks. During the poisoning period 316 lb. of bait were consumed. The number of rats trapped during the week before poisoning and in each of 4 weeks after poisoning are shown in the table.

| | Pre-poison week | Post-poison weeks | | | |
|---------------------------|-----------------|-------------------|-----|----|-----|
| | | 1 | 2 | 3 | 4 |
| <i>R. alexandrinus</i> | 76 | 4 | 7 | 3 | 7 |
| <i>R. rattus</i> ... | 8 | 0 | 0 | 0 | 0 |
| <i>R. norvegicus</i> ... | 21 | 2 | 0 | 5 | 4 |
| <i>R. hawaiiensis</i> ... | 58 | 82 | 111 | 73 | 120 |
| <i>M. musculus</i> ... | 150 | 6 | 24 | 27 | 38 |

The figures speak for themselves; they show that by continuous baiting a great reduction could be effected in the rodents with the exception of *R. hawaiiensis* which presumably consumed a smaller amount of the bait in proportion to other food than did the other rodents, though they ate some bait as was shown by the occurrence of haemorrhages in the bodies of 59.8 per cent. of those trapped in the first week after the end of the poisoning period.

John W. D. Megaw

BONNET, D. D., MAU, E. S. C. & GROSS, B. **Cage Tests with Warfarin on the Hawaiian Rat, *Rattus hawaiiensis* Stone, and the House Mouse, *Mus musculus* Linn., in Hawaii.** *Pub. Health Rep.* Wash. 1951, Dec. 28, v. 66, No. 52, 1734-7, 2 figs.

The bait described in the previous abstract was fed *ad lib.* to 42 rats (*Rattus hawaiiensis*) and 15 mice (*Mus musculus*) which were kept in separate cages; the quantity consumed daily by each animal was recorded. The mean survival period of the rats was 7.9 days, the range was 4-20 days. The mean survival period of mice was 8.6 days and the range was 4-17 days.

Previous observers had found mean survival rates for *R. norvegicus* to be 5.4 days; for *R. rattus*, 5.8 days, and for *R. alexandrinus*, 6.8 days; it is suggested that *R. hawaiiensis* is more resistant to the poison than the other species.

John W. D. Megaw

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

See also p. 523, HUNTER *et al.*, **Parasitological Studies in the Far East. II. An Epidemiologic Survey in Fukui Prefecture, Honshu, Japan.**

See also p. 523, RITCHIE *et al.*, **Parasitological Studies in the Far East. III. An Epidemiologic Survey of Aomori Prefecture, Honshu, Japan.**

PERRY, M. W. **Amebic Granuloma of the Rectum.** *J. Amer. Med. Ass.* 1952, Feb. 2, v. 148, No. 5, 369-70.

GUTIÉRREZ BALLESTEROS, E. & TREVIÑO VILLASEÑOR, A. Aislamiento de una nueva cepa de *Entamoeba histolytica* y tratamiento de amebiasis por "terramicina". [**Isolation of New Strain of *Entamoeba histolytica* and Treatment of Amoebiasis with Terramycin**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1950, Dec., v. 11, Nos. 2, 3 & 4, 93-7. English summary (6 lines).

A Mexican strain of *Entamoeba histolytica* was isolated in culture on various standard media from a patient suffering from amoebic dysentery.

Both this patient and another one, with similar symptoms, were successfully treated with terramycin, which was given in capsules of 250 mgm. each every 3 hours, the total course comprising 32 capsules (=8 gm.). The stools of these patients became negative for parasites from the 5th and 3rd days respectively and subsequently showed no further signs of infection. In both cases sigmoidoscopy carried out after treatment revealed a normal mucous membrane.

C. A. Hoare

See also p. 497, KILLOUGH & MAGILL, **Terramycin in Epidemic Typhus, Amebic Dysentery, and Typhoid.**

DE VELASCO GUZMÁN, R., AMADO LEDO, E. & GÓMEZ BARRY, H. Absceso hepático: cuatro casos tratados con cloroquina. [**Four Cases of Liver Abscess Treated with Chloroquine**] *Archivos Hospital Universitario.* 1951, Sept.-Oct., v. 3, No. 5, 453-93, 5 charts & 31 figs. [34 refs.]

The authors' conclusions in English appended to the paper are as follows:—

"1. Efficacy of Chloroquine in treatment of four cases of amoebic hepatic abscesses here reported is confirmed.

"2. We did not observe toxic manifestations of importance.

"3. Radiologic regression of abscesses is proved.

"4. We emphasize 100 per cent of regressions obtained with method employed as compared with 50 per cent of mortality in our previous four cases of amoebic hepatic abscesses treated with other methods (emetine, antibiotics, surgery)."

GAMBARDELLA, A. & DE MICHELE, D. Guarigione clinica di un caso di epatite colliquativa amebica, con apertura nel cavo pleurico, trattato con cloroquina. [**Clinical Cure of a Case of Colliquative Amoebic Hepatitis Involving the Pleural Cavity, Treated with Chloroquine**] *Acta Med. Italica.* 1951, Oct., v. 6, No. 10, 265-72, 2 figs. & 1 chart. [22 refs.] English summary.

THOMPSON, P. E. & REINERTSON, J. W. **Chemotherapy of Amebic Hepatitis in Hamsters with Emetine, Chloroquine, Amodiaquin (Camoquin), Quinaerine and Other Drugs.** *Amer. J. Trop. Med.* 1951, Nov., v. 31, No. 6, 707-17. [18 refs.]

The authors have described the production of progressive hepatitis in golden hamsters, with a resultant high percentage of deaths, by the injection of cultures of *E. histolytica* with their accompanying bacteria directly into the liver [this *Bulletin*, 1951, v. 48, 1113]. From experimental evidence they concluded that the amoebae rather than the bacteria were responsible for the lesions produced. They have now made use of this method for the study of chemotherapeutic agents. The animals, of either sex, weighed 40 to 50 gm. and were infected after laparotomy under anaesthesia, with different numbers

of amoebae. Death from bacteraemia could be prevented by prior intra-peritoneal vaccination of animals with the bacterial flora involved. Groups, usually of 10 animals, were chosen at random for inoculation and treatment and one untreated group served as control. Drugs known to be of value in the treatment of human amoebic hepatitis, as well as others, were given twice daily either intramuscularly or orally over a period of 4 days, starting a few hours before infection. Each animal was killed 92 hours after infection, the liver being removed and inspected for lesions, which were then excised, weighed, and examined for amoebae. The results of therapy in the treated and untreated groups were assessed from the average weights of lesions and the percentage which contained amoebae. The latter criterion was not so satisfactory as the former since, in spite of efficient treatment, amoebae were found in nearly all livers. Judging by the results obtained the test appeared to be a severe one for the drugs employed, possibly owing to the marked susceptibility of the hamster to amoebic hepatitis, to the virulent character of the amoebae or to exclusion of the drugs from an infected focus as a result of necrosis. Emetine, chloroquine, amodiaquin [camoquin], and quinacrine [mepacrine] were efficient in restricting the lesions. Carbarsone, chloramphenicol [chloromycetin] and aureomycin were less effective, whereas a combination of penicillin and dihydrostreptomycin was ineffective.

J. D. Fulton

KANTEMIR, I. Wirkungsmechanismus des Emetins. [The Mode of Action of Emetine] *Acta Med. Turcica*. 1951, Jan., v. 3, Nos. 3/4, 59-65. [13 refs.]

SIMITCH, T. & PÉTROVITCH, Z. Culture d'*Entamoeba muris* de la souris à la température de 22-23°C. [Cultivation of *Entamoeba muris* from Mice at Temperatures of 22-23°C.] *Ann. Parasit. Humaine et Comparée*. 1951, v. 26, Nos. 5/6, 389-93.

The following is a translation of the authors' summary :—

Although *Entamoeba muris* is a parasite of warm-blooded animals, it multiplies readily *in vitro* at a temperature of 22-23°C.

We have cultivated this amoeba at 22-23°C. in a medium of which the solid part consisted of serum-agar slopes and the liquid part of normal saline. In this medium and at this temperature amoebae were not seen before the 6th day, but they persisted there for a month.

In the cultures of *E. muris*, cysts were seen as well as vegetative forms.

H. J. O'D. Burke-Gaffney

RELAPSING FEVER AND OTHER SPIROCHAETOSIS

BURGDORFER, W. Analyse des Infektionsverlaufes bei *Ornithodoros moubata* (Murray) und der natürlichen Uebertragung von *Spirochaeta duttoni*. [Analysis of the Course of the Infection in *Ornithodoros moubata* (Murray) and the Natural Transmission of *Spirochaeta duttoni*] *Acta Tropica*. Basle. 1951, v. 8, No. 3, 193-262, 20 figs. [43 refs.]

The first part of this monograph is devoted to an account of the morphology of *O. moubata*, based on observations made on various strains of ticks, first a collection made by Professor GEIGY in different parts of the Belgian Congo, then a collection made by Professor ROULET in the neighbourhood of Dakar, and finally some from Tanganyika also collected by Professor Geigy. White mice were used for maintaining the strain of *Spirochaeta duttoni* and testing the infectivity of the ticks.

The author finds that when a tick ingests infected blood the spirochaetes reach the middle intestine or stomach where at 25°C. they may persist up to 16 days in gradually decreasing numbers. A few hours after the meal the spirochaetes gather on the gut epithelium and bore through the gut wall into the haemocoel, and of 200 ticks examined after an infected meal the haemolymph or body cavity fluid showed spirochaetes in 178 examples. A considerable multiplication of the organisms was found to take place in the haemolymph, but no granule formation or other developmental cycle was observed. From the haemolymph the spirochaetes are said to invade the various organs of the tick, starting with the salivary glands, coxal organs and central ganglion on the third day; and the Malpighian tubules on the fourth day. The cavity of these tubules and also the anal excretion were found to remain entirely free from spirochaetes. In the various glands the spirochaetes multiplied by simple and also by multiple transverse division but in the salivary glands only the nymphs showed a strong permanent infection. In the adults these glands usually remained only slightly infected.

The author also studied the behaviour of *S. duttoni* towards the tissues of various tick organs, by introducing capillaries containing emulsions of uninfected salivary glands, central ganglia, or coxal organs. It is considered from the results of these experiments that certain organs may contain substances which attract the spirochaetes.

The above experiments were conducted at 25°C. or above, but when ticks were kept at 20°C. the low temperature merely slowed down the various processes without any formation of granules being observed. The author's experiments also show that infected nymphs may transmit the infection to warm-blooded vertebrates by the bite alone, the spirochaetes being injected directly into the wound with the saliva; or by the coxal fluid in which case the spirochaetes may be washed into the bite wound or even penetrate the skin. In the case of adult ticks the latter method of infection seems the more usual as the salivary secretion is only rarely infected.

The paper is accompanied by useful diagrams illustrating the author's views as to the course of the infection in the tick.

E. Hindle

HEISCH, R. B. & HARVEY, A. E. C. **Chloramphenicol (Chloromycetin) in the Treatment of Experimental Relapsing Fever.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Jan., v. 46, No. 1, 65-70, 1 chart.

The authors tested the effect of chloromycetin [chloramphenicol] in 10 white rats, 7 monkeys and in 2 human patients with general paralysis, all infected with an East African strain of *Spirochaeta duttoni*. The drug was administered orally for 3 days and the daily dose for rats was 500 mgm./kgm., monkeys 400 mgm./kgm. and the human cases 150 mgm. (approx.) per kgm. body-weight.

In rats the treatment shortened the primary attack but did not prevent relapses or residual brain infections. Only two of the 7 treated monkeys relapsed and neither of the two paralytics, but the latter came from an endemic area and may have been partially immune.

E. Hindle

HARRISON, I. B. & WHITTINGTON, R. M. **Antibiotics in the Treatment of Relapsing Fever.** *U.S. Armed Forces Med. J.* 1951, Dec., v. 2, No. 12, 1859-62.

"Six of 7 patients with louse-borne relapsing fever occurring in April and May 1951 among United Nations forces in Korea were treated with 200,000 units of aqueous penicillin every 6 hours for 10 days. One of these patients presumably relapsed after previous treatment with procaine penicillin. Another patient was still febrile and had demonstrable spirochaetes in his blood after

treatment with 900,000 units of procaine penicillin over a 36-hour period. In all the patients treated with aqueous penicillin, there was prompt remission and no relapses occurred. No Herxheimer reactions were observed. One patient was treated with aureomycin with comparable results."

YAWS

TRATMAN, E. K. **A Case of Advanced Tertiary Yaws.** *Brit. Dental J.* 1952, Feb. 5, v. 92, No. 3, 70-71, 1 fig.

This note records and illustrates a distressing case of yaws found within a mile of the General Hospital in Singapore, where the disease is uncommon.

The case was allowed to pass into an extreme tertiary stage before treatment was sought. The patient was emaciated, in great pain and very toxic. In the skull, the nasal bones, left orbit with the eye, palatal part of the maxilla and part of the mandible had been partially or wholly destroyed. The upper and part of the lower lip had gone and the remainder of the latter was bound by scar tissue to the neck. The soft tissues of the left side on the face had been largely destroyed. There were numerous small abscesses breaking down into foul ulcers on the skull. There was evidence of old pellagra.

There were also lesions on other parts of the body, including partial destruction of the bones of the forearm, arms and legs. Although spread of the lesions was brought under control by penicillin and arsenicals with bismuth, the patient rapidly grew worse and died.

[From the photograph shown, it is difficult to realize that the face is that of a living person. Such advanced cases must, fortunately, be extremely rare.]

H. J. O'D. Burke-Gaffney

FERREIRA, F. S. da C. Alguns aspectos clínico-terapêuticos das boubas na Guiné Portuguesa. [**Yaws and Its Treatment in Portuguese Guinea**] *Gaz. Méd. Portuguesa.* 1951, v. 4, No. 4, 1034-45, 24 figs. on 6 pls. & 1 graph. English summary.

In Portuguese Guinea between 4 and 5 per cent. of the total population are infected with yaws. In the present article the author analyses 150 cases, 72 in males, 78 in females; the majority, stated as 65 per cent. (97 or 98?) were below 13 years of age, 14 per cent. (21) were between 14 and 21 years, and 21 per cent. (31 or 32?) were over that age. Fifty were in the primary stage, 90 in the secondary, and 10 showed tertiary lesions—3 with osteitis and periostitis, 2 with palmar and plantar keratoderma causing difficulty in walking, 2 with chronic ulcers, 2 with gangosa and one with goundou.

Treatment was with stovarsol. Tables are reproduced showing that of 14 patients with primary yaws, 12 were cured, 7 of them in 6-7 days by a total dosage of 3-4 gm.; 4 in 6 days with 4-5 gm. and one in 11 days with a total of 6-7 gm. Of 41 with secondary yaws 32 were cured; 18 out of 22 in 7 days with a total dosage of 3-4 gm.

Summing up these two sets of patients: 12 out of 14 with primary yaws were cured in 6 to 11 days with a total dosage of 3-7 gm. and of 41 with secondary yaws 32 were cured in a period of 6 to 16 days with dosage ranging between 3 and 15 gm. In two patients treatment had to be interrupted on account of severe headache, the sole symptom of intolerance observed by the author. [Nothing is said of the treatment of the tertiary cases, nor is any reference

made to the remaining 36 in the primary stage or the other 49 in the secondary stage.] The paper is illustrated by 20 excellent photographs of the clinical states and by X-rays of the bony changes.

H. Harold Scott

BAYLET, R. Apparition d'une parakératose au cours d'un traitement bismuthique chez un ancien pianique. [**Appearance of a Parakeratosis during Bismuth Treatment of a Long-Standing Case of Yaws**] *Bull. Méd. de l'Afrique Occidentale Française*. 1951, v. 8, No. 2, 225-6.

The patient, an African hospital orderly of 23, was given bismuth, because penicillin had failed to reverse a positive serological test attributed to yaws acquired in childhood. After the second injection of bismuth, the patient noticed a painless, slightly pruriginous eruption on his neck. When treatment was interrupted for 3 months the eruption resolved a little, but was by now diffuse on the back and chest. As the positive serological result persisted, a second course of bismuth was started, in the belief that the condition might be syphilitic. After the second injection, the eruption flared up. Treatment was suspended twice because of albuminuria.

The keratotic papules are described in detail and their spread to all parts of the body surface is recorded. Eventually, cessation of treatment resulted in considerable attenuation of the eruption, but the positive blood persisted.

The chief interest in this case lies in the point that the eruption, attributed to the bismuth injections for yaws, closely resembled a secondary syphilitic lesion.

H. J. O'D. Burke-Gaffney

HILL, K. R. **The Modern Treatment of Framboesia (Yaws)**. *West Indian Med. J.* 1951, Sept., v. 1, No. 1, 81-92, 5 figs. [37 refs.]

The author considers the possible objects of an anti-yaws campaign and concludes that "the prime objectives of any anti-framboesial campaign should be mass treatment combined with public health measures to totally eradicate the disease". He next discusses the ideal therapeutic agent. Arsenical and bismuth preparations are regarded unfavourably since they require long supervision to ensure that an adequate dose is received. Repository penicillin, in adult doses of two injections of 1.2 mega units 3-5 days apart, "far surpasses the giving of arsenic, bismuth and also the oral antibiotics, aureomycin and chloromycetin".

C. J. Hackett

HILL, K. R., RHODES, Katerina, ESCOFFERY, G. S. & MURRAY, C. C. **Framboesia (Yaws) treated with Aureomycin**. *West Indian Med. J.* 1951, Sept., v. 1, No. 1, 93-6. [14 refs.]

—, — & —. **Aureomycin in the Treatment of Framboesia**. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Jan., v. 46, No. 1, 71-5.

These two papers report observations on the same 10 patients, in Jamaica, with secondary yaws lesions, in 7 of whom the primary lesion was still present. They were given aureomycin 25 mgm. per kilo body weight by mouth daily for 14 days (total dosages 3.5-14 gm.). The only side effect of the treatment was "stomach burn" in one patient on the second day of treatment. Their ages ranged from 4-16 years and the infection was said to have been present 1-12 months. "The majority of the cases were healed six weeks from the first day of treatment, and all cases were completely healed at six months." At the end of a year there were no relapses or reinfections. The immediate

response was slower than that after penicillin. Twelve months after treatment the serum Kahn reactions had become negative in 6 and had fallen to a low level in two. The Kahn reactions of the other two were negative when treatment was commenced. One of these, aged 4 years, had had a primary yaw for 2 months and also had non-ulcerative plantar framboeside. The other, aged 11 years, had had yaws for 12 months and although the primary yaw had healed a papular framboeside and a non-ulcerative plantar framboeside were present. [It is surprising that both these cases were Kahn-negative.] There was often a rise in titre of the Kahn reaction two weeks after the start of treatment ; a fall had nearly always occurred by the 6th week. The authors state that " the titre of the reagin in framboesia in general tends to rise much more slowly than that in syphilis after initial infection ; likewise, after treatment, the fall in titre in the framboesial patient is much slower ".

[The second paper, published 5 months after the first, reports observations for only 6 months, while the first covers 12 months' observations. The few clinical notes in the second paper could well have been included in the first and then there would have been no need for its publication.]

C. J. Hackett

MCLEOD, Charlotte P. & MAGNUSON, H. J. **A Study of Cross Immunity between Syphilis and Yaws in Treated Rabbits.** *J. Venereal Dis. Information.* 1951, Nov., v. 32, No. 11, 305-9. [13 refs.]

" In a study of cross immunity between syphilis and yaws in rabbits with infections of 7 to 10 months' duration before treatment, the following results were obtained :

" 1. Both syphilis rabbits and yaws rabbits failed to develop lesions upon reinoculation with the homologous strain of spirochetes.

" 2. Rabbits originally infected with syphilis showed a low degree of immunity to reinoculation with yaws spirochetes.

" 3. Rabbits originally infected with yaws showed little or no immunity to reinoculation with as few as 100 syphilis spirochetes.

" 4. The serum from yaws rabbits which were not immune to syphilis possessed a substantial degree of immobilizing activity against *T. pallidum*."

LEPROSY

MELSOM, R. Tre nye tilfelle av lepra. [Three New Cases of Leprosy] *Tidsskr. f.d. Norske Lægeforening.* 1952, Feb. 1, v. 72, No. 3, 65-7, 2 photos. English summary.

There are now only 11 known cases of leprosy in Norway, all of them isolated in the leprosy hospital in Bergen. As many as 3 of these cases were discovered in 1951. Yet they evidently belong to the old endemic infection instead of representing the sporadic infections which are inevitable among Norwegian seamen belonging to the third largest merchant fleet in the world. Since 1930 there have been a few such cases of leprosy imported by seamen from abroad.

The three new discoveries in 1951 were siblings, two brothers and a sister, whose father was healthy but whose mother had been admitted to the leprosy hospital in 1931 and had died there in 1933. The infection must therefore date back at least 20 years. All three patients had been liable to develop sores from burns on the forearms. All of them showed a maculo-tuberculous rash on the trunk and limbs, and all of them showed typical leproma on biopsy of certain

nodules. The disease made its first appearance by involving the peripheral nerves. The first case was that of a man born in 1925. His hands showed marked symmetrical atrophy of the muscles with slight flexor contraction of the fingers. The second case was that of the sister, who was born in 1923 and who showed the same symmetrical atrophy of the muscles of her hands. It was the discovery of leprosy in this brother and sister that led to a search for the disease in other members of the family, including an elder brother born in 1913. He was abroad at sea. Dr. Melsom got into touch with his ship's doctor who persuaded him to undergo an examination by several leprologists in the Pacific. None of them could say whether he suffered from leprosy or not. Yet when examined in Bergen he presented a papular rash on the trunk and limbs and numerous cutaneous and subcutaneous nodules up to the size of a pea. Typical leproma was found on biopsy. The experience of his younger brother (case No. 1) showed how easy it is to overlook leprosy when the possibility of it is not in the doctor's mind; in 1940 this patient consulted a neurologist because of the remarkably frail appearance of his hands, and the treatment recommended by this specialist was electrical.

Claude Lillingston

ARGOSINO, A. Y. **A Brief Bibliography of Leprosy in the Philippines.** *J. Philippine Med. Ass.* 1951, Oct., v. 27, No. 10, 617-24. [214 refs.]

The author, who is Librarian in the College of Medicine, University of the Philippines, originally set out to compile a Philippine medical bibliography before the Pacific war in 1941. He worked on it until the end of 1944, but the manuscript was burnt by the retreating Japanese in 1945. After the war, incomplete records made it difficult to undertake as much as was hoped. The present bibliography of leprosy in the Philippines is necessarily brief and incomplete and represents only a segment of the proposed "Philippine Index Medicus". The author asks those whose works on leprosy are not included in this bibliography to send him the relevant data so that he may include them in the fuller publication which is expected to appear soon.

Despite all the difficulties, the author has succeeded in assembling 214 references to leprosy in the Philippines. They are given alphabetically under the authors' names. A large number of the entries refer to the *J. Philippine Med. Ass.*, the *Philippine J. Science* and the *Monthly Bulletin* of the Bureau of Health.

This painstaking production will be of considerable use to those requiring information on leprosy in the Philippines.

H. J. O'D. Burke-Gaffney

DE LA LASTRA, J. M. Bacteriología de la lepra. [**Bacteriology of Leprosy**] *Med. Colonial*. Madrid. 1952, Jan. 1, v. 19, No. 1, 11-33.

A general review.

CURBAN, G. V. Estudo morfológico e quantitativo do método de Halberg na coloração do bacilo da lepra. [**Study of Halberg's Method of Staining Leprosy Bacilli from the Morphological and Quantitative Aspects**] *Rev. Inst. Adolfo Lutz*. São Paulo. 1946, Aug., v. 6, No. 1, 50-63, 4 coloured figs. on 2 pls. English summary.

MUKERJI, A. **Differentiation of the Human and Rat Leprosy Bacilli by Irradiation.** *Leprosy in India*. 1951, Oct., v. 23, No. 4, 196-200.

The author found that on exposure of human leprosy bacilli for 5 hours in the sun, for 2 hours in infra-red or ultra-violet rays, or for half an hour to roentgen rays (42r) from a 150 K.V.P. plant, the acid-fast staining property is significantly

altered. Under similar exposures the bacilli of rat leprosy are not changed in this respect. These effects "go to suggest that the whole process is possibly one of photodynamic action, either by changing the mycolic acid or more possibly by bringing about changes in the intactness of the cell or both". This test may be used in distinguishing the two organisms. *Ernest Muir*

MONTESTRUC, E. & BLACHE, R. A propos de la transmission de la lèpre par les moustiques. [**The Transmission of Leprosy by Mosquitoes**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 11/12, 715-19.

The authors refer to the work and writings of Adolfo LUTZ, who argued in favour of the transmission of leprosy by mosquitoes, basing his argument on 5 points: leprosy is not transmitted from patients imported to London and Paris; many patients have no history of contact and the first lesions seen are very frequently on parts exposed to the bites of mosquitoes; the first appearance of leprosy was contemporaneous with the introduction of mosquitoes into Hawaii and in some Polynesian islands; the direct transmission of leprosy experimentally has never been successful; lepra bacilli are not always acid-fast, and they form fine granules and filaments which might be the infective form of the germ.

The authors tell of a woman with an enormous leproma of the face. She had 4 children. The three oldest showed no sign of leprosy, but the youngest showed 9 round erythematous zones on the face, the sites of mosquito bites. Serum taken from one of these showed many bacilli and numerous loaded globi. Seven days later serum taken from the same site was negative. After another 7 days there were new bites with acid-fast bacilli, but a week later these marks and the bacilli had disappeared. The opinion is expressed that children born in such circumstances should be vaccinated with BCG at birth as it would be a mistake to vaccinate them later when they are loaded with Hansen's bacilli. *Ernest Muir*

MADDOCK, R. K. **Skin Scrapings in Leprosy. Positive Results by the Wayson Technique in Eighty-Four Supposedly Arrested Cases.** *J. Amer. Med. Ass.* 1952, Jan. 5, v. 148, No. 1, 44-5.

In 19 out of 59 patients, who after examination of smears of skin scrapings taken by the ordinary method had been considered bacteriologically negative, positive smears were obtained by using Wayson's method. The technique is as follows: "The area of skin to be examined is pinched tightly between the thumb and forefinger of the left hand. Pressure is applied long enough to blanch the skin. An incision is then made with a corner of a single-edged razor blade through the full thickness of the skin that is being held between the fingers. The incision need not be more than 5 mm. in length and is usually between 3 and 5 mm. in depth; however, great care should be exercised not to enter the fatty subcutaneous tissue. After the incision is made the razor blade is then rotated about 70 to 90 degrees and one surface of the incision scraped as the razor blade is brought back to the starting-point of the incision. The entire procedure is accomplished rapidly in three motions. An effort is made to obtain a maximum amount of tissue, which, of course, is relatively small, with a minimum amount of dilution by tissue juice and blood. The material obtained by the 'snip' is then carefully spread on a new (never used previously) glass slide, stained, and examined in its entirety. The smear should reveal numerous clumps of epithelial cells, and, if these cells are not present in rather large numbers, the snip should be considered inadequate and of relatively little value unless positive."

[The main difference between this and the method used in most leprosy institutions is the depth of the incision. No explanation is given why one should avoid entering the fatty subcutaneous tissue. KHANOLKAR (this *Bulletin*, 1952, v. 49, 56) in his method of taking biopsy tissue for histological examination insists on including fatty tissue, as nerves containing the only few bacilli present are sometimes in that layer.]

Ernest Muir

WADE, H. W. **The Persistent Problem of Latent Leprosy.** *Rev. Argentina Dermatosifilologia*. 1951, Apr.-Sept., v. 35, Nos. 2/3, 105-11. [33 refs.]

This article appears in a number of the *Revista* dedicated to the memory of Professor L. Baliña, and refers to his particular interest in this still unsolved problem: where are the bacilli located during the latent period between infection and the first appearance of signs? Three possibilities are mentioned; the nasal mucosa, the superficial lymph nodes, and the skin. The great difficulties in verifying any of these sites are dwelt on, but the author considers that the last two are most likely. He recommends, in making examinations, the multiple scraped-incision smears of the skin as in the Carville method which Baliña used. [No mention is made of KHANOLKAR's contention that the bacilli lie latent in the deeper nerves in and below the skin, and must be looked for in deep biopsies which include subcutaneous fat, this *Bulletin*, 1952, v. 49, 56.]

Ernest Muir

FIOL, H. & JONQUIÈRES, E. D. L. *Lepra de Lucio. Un primer caso registrado en la Argentina.* [**The Leprosy of Lucio. One of the First Cases Registered in Argentina**] *Rev. Argentina Dermatosifilologia*. 1951, Oct.-Dec., v. 35, No. 4, 235-45, 7 figs. [16 refs.] French summary.

After a review of the literature of this form of leprosy the case is described. The patient, formerly resident in Cuba, had lived in the province of Buenos Aires since 1923. The affection was of about 6 years' duration, and his age was 61. The patient was emaciated, intellectually blunted, with complete alopecia of the face and fronto-parietal region. The skin was dry and yellow, but without apparent lesions apart from the absence of hair. Both skin and nose were strongly positive bacteriologically. There were large deep ulcers of the legs (shown in illustrations), appearing in the midst of hard, infiltrated skin, with high edges and foetid surfaces. There were patches of skin with an erythematous and purpuric appearance, going on to necrosis and ulceration. The authors emphasize the absence of amyotrophy and muscular reaction. The cause of the condition, and especially of the vascular inflammation, is not known but is supposed to be at least partly due to sensitization to a mixture of *Myc. leprae* and other organisms, and possibly to nutritional and racial factors.

Ernest Muir

FLOCH, H. & DESTOMBES, P. *Sur un nodule calcifié d'un nerf cubital lépreux.* [**A Calcified Nodule of an Ulnar Nerve in Leprosy**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 11/12, 719-22.

The authors review the literature about nerve abscesses in leprosy, the first reference being that of MARESTANG in 1892. They remark, however, that the word "abscess" is not the correct word to use. They comment upon the rarity of this condition, saying that while LOWE found it in 2 per cent. of 5,000 leprosy cases [this *Bulletin*, 1935, v. 32, 336], CHATTERJI [in Calcutta] found only 4 in more than 3,000 patients [*ibid.*, 1934, v. 31, 549]. [The former was in the Nizam's Dominions, and half of them are credited to the use of iodides.]

Calcification is the last stage in the nerve abscess in the tuberculoid type of the disease, the process going on, when the contents are not evacuated, to the deposit of calcium. Microscopic examination shows no remaining trace of nerve fibres or of the tuberculoid structure.

Ernest Muir

DHARMENDRA, MUKERJEE, N. & CHATTERJEE, S. N. **Lepromatous Leprosy with Exclusively Localized Macular Lesions.** *Leprosy in India.* 1951, Oct., v. 23, No. 4, 200-211. [34 figs. on 15 pls.]

Eight cases are described with localized macular lesions which were clinically not of the lepromatous type. However, repeated bacteriological, immunological and histological examinations showed that they were actually lepromatous cases even from the beginning. The lesions of these cases simulate tuberculoid lesions in being localized and well circumscribed, and the presence of sensory changes and thickened nerves often makes the similarity all the more marked. These lesions are, however, smooth, soft and succulent, and their margins are not as clearly cut as those of the tuberculoid lesions. Bacteriological examination shows large numbers of bacilli, the lepromin test is negative (though occasionally there may be slight positive reactions), but the histological findings may not be clear in the early stages. "It has sometimes been stated that the tuberculoid lesions may occasionally show large number of bacilli, and that the lepromin test may sometimes be negative in a case of tuberculoid type. The existence of localized lesions of the lepromatous type, as described herein, throws doubt on the veracity of these statements, since it is possible that they might have been based on such lesions having been wrongly classified as 'tuberculoid'." [It must not, however, be forgotten that reacting tuberculoid lesions sometimes show huge numbers of bacilli for a time, and then spontaneously heal up permanently.]

Ernest Muir

GHOSH, K. K., DHARMENDRA & DEY, N. C. **Nose and Throat Lesions in Cases of Leprosy of the Lepromatous Type.** *Indian Med. Gaz.* 1951, Sept., v. 86, No. 9, 400-403, 2 coloured figs. on pl.

This is an analysis of 80 out-door lepromatous cases, after a clinical and bacteriological study with anterior and posterior rhinoscopy and laryngoscopy. It is stated that serious involvement of the larynx appears to be less common in India than in some other countries. For example, the report of ARANTES in Brazil is quoted, where ulceration and perforation of the nasal septum occurred in 35 per cent. of 1,882 cases, while SLOAN (before the introduction of the sulphones) stated that tracheotomy was often necessitated as a life-long procedure. In the cases examined the common changes in the nose consisted of infiltration, nodulation, atrophy, ulceration and perforation of the nasal septum, the latter being present in 15 out of the 80 cases. The pathological changes in the pharynx and larynx were of the same nature, but usually less marked—in fact the changes gradually became less as one proceeded from the nose to the nasopharynx and larynx.

Ernest Muir

CHAUSSINAND, R. Aspect actuel du problème thérapeutique de la lèpre. [The Present Position of the Therapeutic Problem of Leprosy] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 11/12, 765-73. [10 refs.]

This is an excellent review of the work that has been done on the sulphones and certain auxiliary drugs up to the present time. It agrees with the generally held view that for mass treatment DDS is the drug of choice, because of its effectiveness, simplicity of administration, and low price.

Ernest Muir

DE SOUZA-ARAÚJO, H. C. The Sulfones (Promin and Diasone, and AMGL and AMBS¹ from Institute Butantan) have no Bacteriostatic Action, *in vitro*, on Acid-Fast Bacilli isolated from Lepers, nor on *Bacillus Stefansky*, *in vivo*. *Mem. Inst. Oswaldo Cruz*. 1949, Sept.-Dec., v. 47, Nos. 3/4, 675-7. [Portuguese version 671-4.]

The author reports the results of direct action of four sulphone derivatives on two strains of acid-fast bacilli isolated from leprous patients, and on Stéfansky's bacillus. The application of promin in a dilution of more than 1 in 4,000 to the acid-fast strains in glycerin broth failed to inhibit growth. With diasone even 1 in 1,000 dilution did not entirely inhibit growth *in vitro*. Mixture of emulsion of rat leprosy with promin (0.4 gm. in 1 cc.) injected into rats produced signs of rat leprosy within 5½ months. Likewise diasone (solution of 2 tablets in 10 cc. of water) did not inhibit rat leprosy when used in the same way. Also two other sulphone preparations produced locally similarly failed to inhibit growth of either the acid-fast cultures or the emulsion of Stéfansky's bacillus. The conclusion is that the sulphones used did not show bacteriostatic action. [Compare the results obtained through different methods by MAURI *et al.*, this *Bulletin*, 1952, v. 49, 412.] Ernest Muir

PENNEC, J. Essai de thérapeutique tissulaire dans les lésions oculaires et trophiques de la maladie de Hansen. [Trial of Tissue Therapy in Ocular and Trophic Lesions in Leprosy] *Rev. Service Santé Publique Guadeloupe*. 1951, v. 2, Nos. 4/5, 5-11.

An account is given of the treatment of eye conditions in 5 patients, one of them apparently of the neural type and the others fairly advanced lepromatous cases. The patients were given sulphone treatment and at the same time injections of extract of placenta, both intramuscularly and subconjunctivally by the method of Filatov. The improvements were slight and chiefly subjective, but the author had the impression that if treatment had been carried on longer better results would have been obtained. Also 2 cases with torpid ulcers of the lower limbs were treated, with promising results, and the author considers that this may be a useful auxiliary treatment in preventing and clearing up deformities. Ernest Muir

SAENZ, B. Lepra Reaction : its Treatment with Dihydrostreptomycin. *Arch. Dermat. & Syph.* 1952, Jan., v. 65, No. 1, 59-69. [20 refs.]

After reviewing the nature of lepra reaction the author gives an account of 9 patients suffering from lepra reaction, some of them as the result of sulphone treatment. Dihydrostreptomycin was given in the daily amount of 2 gm. intramuscularly, divided into three doses, one every 8 hours, the course lasting from 10 to 20 days. In one patient there was no improvement; in another there was a relapse which was checked by further treatment; in the remaining cases there was abatement of painful neuritis, healing of perforating ulcers and of ulceration of the nasal septum and other parts of the body; there was control of pyrexia, gain of weight and improvement of the general condition; in some cases there was a modification of the bacteriological findings. Most patients became capable of beginning or of continuing sulphone treatment. "Further clinical investigations along these lines will be required in order to determine the real value of this drug in the control of lepra reaction as well as in the therapy of leprosy." Ernest Muir

MARIE-SUZANNE (Soeur), NOEL, R. & SOHIER, R. Comparaison des lésions histologiques provoquées chez le rat blanc, par l'inoculation du bacille de Hansen et de divers autres bacilles acido-résistants. [**Comparison of the Histological Lesions Provoked in White Rats by the Inoculation of *Mycob. leprae* and Various Other Acid-fast Bacilli**] *Ann. Inst. Pasteur.* 1952, Jan., v. 82, No. 1, 50-54, 12 figs. on 2 pls.

Five strains of acid-fast organisms were injected into the testicles and under the skin of white rats. These were (1) bacilli from a leprous nodule, (2) a culture from leprous tissue called "Chauviré", (3) paratubercle bacilli, (4) paratubercle bacilli of another strain, (5) acid-fast bacilli cultured from a human leproma. After two months (1), (2) and (4) produced a rapid diffusion of histiocytes charged with many bacilli, but no construction of epithelioid nodules; (3) produced epithelioid nodules with diffuse lymphocytic reaction; (5) produced an ordinary reactionary granuloma which was quickly absorbed, but no bacilli or epithelioid nodule. After 10 months (1) and (2) had formed either an epithelioid tubercle surrounded by lymphocytes but without bacilli, characteristic of a leprous tuberculoid, or the characteristic lesion of lepromatous leprosy and consisting of areas of well defined histiocytes surcharged with bacilli and often at the point of being transformed into typical globi; (4) showed a central necrotic spot at the point of inoculation surrounded by lymphocytic reaction and some masses of histiocytes which neither were epithelioid nor did they contain bacilli; (3) was entirely cicatricial; (5) showed no lesion. The conclusion is that *Mycob. leprae* and the "Chauviré" culture provoke identical tuberculoid and lepromatous lesions, which were not provoked by the paratubercle bacilli used.

Ernest Muir

HELMINTHIASIS

WITENBERG, G. **Some Unusual Observations on Helminthiasis in Israel.** *Harefuah.* Jerusalem. 1951, Nov. 15, v. 41, No. 10. [In Hebrew 178-9. English summary 180.]

The English summary appended to the paper is as follows:—

"1. A case of human infection by *Ancylostoma caninum* is reported. One specimen of this species was found among numerous specimens of *Necator americanus* expelled by anthelmintic treatment in an immigrant from Cuba.

"2. Ova of *Physaloptera caucasica* were diagnosed on a microphotograph of human faeces sent by a clinical laboratory.

"3. Three cases of urinary infection by *Diploscapter coronata* are recorded.

"4. A second case of human infection by *Gnathostoma spinigerum* is recorded. A larva was removed from an abscess of the arm.

"5. Three cases of local infection by *Moniliformis moniliformis* were established, one of them in a child, 20 months old, the second 2 years old, and the third an adult—all from the same locality.

"6. *Trichostrongylus* sp. was found as a common parasite of immigrants from Iraq.

"7. A natural infection of a cat by *Dracunculus medinensis* in the vicinity of Jerusalem was established. This is regarded as proof that Israel offers favourable conditions for the propagation of this parasite.

"8. Over 20% of immigrants from Yemen are infected with *Schistosoma mansoni*. *Sch. haematobium* occurs among them also but is rare.

"9. The sharp diminution of *Ascaris* and *Trichocephalus* infection in Israel, from presumably 30% of the inhabitants to less than 2% is explained by the absence of vegetables which, before the war, mostly came from Arab gardens manured by human excreta."

HUNTER, G. W., RITCHIE, L. S., NAGANO, K. & ISHII, N., with the technical assistance of R. MURAKUNI, C. PAN, R. E. WEBER, J. T. SZEWCZAK & S. ASAKURA. **Parasitological Studies in the Far East. II. An Epidemiologic Survey in Fukui Prefecture, Honshu, Japan.** *Japanese Med. J.* 1950, Dec., v. 3, No. 6, 359-64.

A parasitological survey by faecal examination was carried out on 1,296 persons selected at random from rural and urban populations in Fukui Prefecture. The percentage incidence of infection with helminths was found to be as follows: *Ascaris lumbricoides*, 80.9; hookworm, 12.9; *Trichuris trichiura*, 63.7; *Trichostrongylus* sp., 3.5; *Hymenolepis nana*, 0.5; *Clonorchis sinensis*, 0.8; *Metagonimus yokogawai*, 0.5; other heterophyids, 1.3; *Strongyloides stercoralis*, 0.3. The percentage incidence of infection with protozoa was found to be as follows: *Entamoeba histolytica*, 11.3; *E. coli*, 29.2; *Endolimax nana*, 20.3; *Iodamoeba bütschlii*, 2.6; *Giardia intestinalis*, 8.4; *Chilomastix mesnili*, 8.9. The intensity of infection was calculated for *A. lumbricoides*, *T. trichiura* and hookworm, in which density indices of 106, 68 and 55 respectively were found. An endeavour was made to check the previous report of the occurrence of *S. japonicum* in the Prefecture by a search for snail intermediaries, but no *Oncomelania nosophora* was found nor did any of the other related snails prove to be infected.

The unusually high incidence of protozoal infection in people of Naruka was investigated and it is concluded that it is due largely to the use of drinking water from polluted streams.

J. J. C. Buckley

RITCHIE, L. S., HUNTER, G. W., PAN, C. & SZEWCZAK, J. T., with the technical assistance of S. IZUMI, R. E. WEBER, Y. HISHINUMA & S. ASAKURA. **Parasitological Studies in the Far East. III. An Epidemiologic Survey of Aomori Prefecture, Honshu, Japan.** *Japanese Med. J.* 1950, Dec., v. 3, No. 6, 365-71.

This is an account of the second series of parasitological surveys [see above] undertaken in Japan in 1947, and carried out in Aomori Prefecture, the northern-most Prefecture on Honshu Island. Of 1,548 persons examined, the percentage incidence of infection with helminths was as follows: *Ascaris lumbricoides*, 80.9; *Trichuris trichiura*, 63.4; hookworm, 7.8; *Trichostrongylus* sp., 38.4; tapeworm, 0.2; *Clonorchis sinensis*, 0.5; heterophyids, 0.6; *Enterobius vermicularis*, 9.7, of 206 examined by anal swab. The percentage incidence of infection with protozoa was as follows: *Entamoeba histolytica*, 7.4; *E. coli*, 31.0; *Endolimax nana*, 17.3; *Iodamoeba bütschlii*, 3.4; *Giardia intestinalis*, 6.8; *Chilomastix mesnili*, 5.0. The parasite density indices of *A. lumbricoides*, *T. trichiura* and hookworm were 122, 55 and 38 respectively.

One of the most striking features of this survey was the high incidence of *Trichostrongylus* which averaged 38.4 per cent. and in a group of 121 school-children at Tsuruda the incidence was 82.6 per cent. Another surprising feature was the generally lower parasite rate at Hachinoe, where a city water supply was lacking, sanitary measures were not enforced and night-soil was used as a fertilizer. To account for this paradoxical state of affairs it is pointed out that the locality has a volcanic ash soil, the rainfall is lower, dry farming is practised and night-soil is more effectively processed.

J. J. C. Buckley

NÁJERA, L. Dispositivo para la concentracion de huevos de helmintos en heces. [**Method of Concentrating Helminth Ova in Faeces**] *Rev. Ibérica de Parasitología*. 1950, Oct., v. 10, No. 4, 465-70, 4 figs.

The method proposed is a modification of the Willis floatation technique. For this purpose the author uses a glass container, open at both ends and made up of two cylindrical portions, 6 and 31 mm. in length respectively and 8 and 24 mm. respectively in diameter, with an intervening conical portion 25 mm. in length sloping from the larger to the smaller. The ends are closed with cork or rubber stoppers. Removing the cork at the wide end, one introduces the faeces from an ordinary specimen receptacle (40 mm. in diameter and 16 mm. deep) together with some glass beads; the stopper is replaced, the tube inverted and filled with saturated salt solution; the smaller plug is then inserted and the whole well shaken to obtain a homogeneous emulsion. Then the smaller plug is again removed and the receptacle filled to the brim with the saline. If there are air bubbles from the shaking they are got rid of by a drop or two of amyl alcohol, and a coverslip replaces the cork. The vessel is then set aside for 20-30 minutes, the coverslip transferred to a slide and examination is carried out in the usual way.

The author claims that this modification of the original method gives a concentration 25 times as great and he gives two illustrations; one showing a single ovum of *Ascaris lumbricoides*, seen after examining 3 fields by the usual method, and the other showing 7 ova in the field by the new method.

H. Harold Scott

PLUMAUILLE, J. Cirrhose grave à *Schistosoma haematobium* chez une fillette malinké. [**Severe Cirrhosis due to Schistosoma haematobium in an African Child**] *Bull. Méd. de l'Afrique Occidentale Française*. 1951, v. 8, No. 2, 235-6.

DE MOURA, S. A. L. Schistosomose mansonii autóctone em Santos. [**Autochthonous S. mansonii Infection in Santos**] *Rev. Inst. Adolfo Lutz*. São Paulo. 1945, Dec., v. 5, No. 2, 279-311, 22 figs. [36 refs.]

NAJIM, A. T. A Male *Schistosoma mansonii* with Two Sets of Testes. *J. Parasitology*. 1951, Dec., v. 37, No. 6, 545-6, 1 fig.

LAGRANGE, E. & SCHEECOMANS, G. La bilharziose expérimentale à *B. mansonii* chez le cotton-rat (*Sigmodon hispidus*). [**Experimental S. mansonii Infection in the Cotton Rat**] *Ann. Parasit. Humaine et Comparée*. 1951, v. 26, No. 4, 334-7.

The authors' summary in French is translated as follows :—

Generally speaking, schistosomiasis develops in the cotton-rat in a manner similar to that in other susceptible mammals. Nevertheless the following points are worth noting :—

1. In no case did intestinal haemorrhage, which kills 20 per cent. of our mice, cause death in cotton-rats, even when the infections were of eight months duration.

2. In no case have we seen, in freshly examined liver, necrosis of the liver cells due to the parasites, which is so common in infected mice. The liver pulp is intact and the cells show up distinctly when crushed between slide and cover-glass. We cannot explain why 2 cotton-rats of one lot of 10, and the only ones in our batch of 38, exhibited a typical cirrhosis. On the other hand, we have never seen the "pseudo-tubercles" which are formed around eggs in the liver of mice. In the cotton-rat the eggs seem to cause no reaction, just as the

adults seem to be non-pathogenic. Abundant residual pigment from digested haemoglobin is proof, however, that blood is consumed. The cotton rats seem to survive the infection for an indefinite period. Eggs are always scanty in the faeces and hatch badly, but accumulate in large numbers in typical subserous formations in the small intestine. Although the mouse is clearly to be preferred for chemotherapeutic research, the cotton-rat is useful for the study of certain aspects of the development of schistosomiasis. J. J. C. Buckley

HOFFMAN, D. O. & ZAKHARY, R. **The Effect of Temperature on the Molluscicidal Activity of Copper Sulfate.** *Science*. 1951, Nov. 16, 521-3, 2 figs. [11 refs.]

The influence of temperature on the effectiveness of copper sulphate as a molluscicide was investigated experimentally with *Biomphalaria boissyi* collected from an irrigation drain near Cairo. The snails were exposed to copper sulphate pentahydrate in concentrations varying from 0.05 to 100 p.p.m. at 5 different temperatures ranging from 14° to 26°C. which resemble the seasonal variations in water temperature in Egypt. The results of the exposures are illustrated by diagrams which show that the molluscicidal effect of the copper sulphate becomes greatly enhanced according as the temperature is raised. The estimated LD₅₀ values are as follows: 14°, 13 p.p.m.; 17°, 4.8 p.p.m.; 20°, 1.4 p.p.m.; 23°, 0.58 p.p.m.; 26°, 0.25 p.p.m.

"In view of (a) the prevalence of bilharziasis, (b) the fact that copper sulfate is currently the only chemical in large-scale use as a molluscicide, and (c) the fact that the number of snails in a given canal, as estimated by the use of dip nets or palm-leaf traps, may decrease as much as 80% during the hot summer months without any external treatment, the importance of temperature as a factor in snail control work can scarcely be overemphasized."

J. J. C. Buckley

MILLER, M. J. & MUNROE, E. **Schistosome Dermatitis in Quebec.** *Canadian Med. Ass. J.* 1951, Dec., v. 65, No. 6, 571-5, 2 figs.

The authors give a general account of schistosome dermatitis and then describe the finding of a local focus in Quebec in the early summer of 1949 when a skin rash was reported as occurring in persons bathing in the Ottawa River at St. Anne de Bellevue. A similar rash was apparently known to the local residents during the past 50 years and was said to occur chiefly in the month of June. Two species of the snail *Stagnicola* and one of *Physa* were found and both types emitted cercariae of schistosomes. The cercariae from *Stagnicola*, of which 10 per cent. were infected, were proved by means of experimental infection of birds, to belong to a species of *Trichobilharzia*. "At first none of the workers who handled the cercariae developed a dermatitis, but within a few days one laboratory assistant proved to be susceptible, developing the rash on the hands. The course of infection was then followed experimentally in this same person. Three cercariae in a drop of water were placed on the dorsum of the hand, and within two minutes there was a prickling sensation on the infected area. By the time the water had dried there were three erythematous spots about 0.5 mm. in diameter; these were itchy and persisted for several hours but then gradually disappeared. By the next morning, however, three red and itchy papules were present. The papules gradually increased in size until they were about 5 mm. in diameter. They were constantly itchy, and no relief was obtained by the use of iodine, alcohol, ether,

or of a proprietary remedy containing calamine, chloroform, menthol, camphor, and alcohol. The itching was more noticeable at night. The papules persisted for about seven days, but by the fifth day they began to decrease in size and became less itchy,"

J. J. C. Buckley

BATTE, E. G. & SWANSON, L. E. **Laboratory Evaluation of Organic Compounds as Molluscacides and Ovocides, II.** *J. Parasitology*. 1952, Feb., v. 38, No. 1, 65-8.

"1. A total of 98 compounds were evaluated for their molluscicidal activity against lymnaeid snails. Pentachlorophenol, 2,4-dinitro-6-phenylphenol and dinitro-o-cyclohexylphenol gave 100 per cent mortality following 24-hour exposure in concentrations of 1 ppm. These compounds show the most promise as molluscacides and will be tested under field conditions.

"2. Fluke ova failed to hatch after an exposure of 24 hours to 2.5 ppm of sodium pentachlorophenate, 5 ppm of dinitro-o-cyclohexylphenol, dicyclohexylamine salt, or 5 ppm of sodium 2,4,5-trichlorophenate."

NEGhme, A. & BERTIN, V. Estado actual de las investigaciones sobre *Diphylllobothrium latum* en Chile. [**Present Condition of Investigations into Infestation by *Diphylllobothrium latum* in Chile**] *Rev. Med. Chile*. 1951, Oct., v. 79, No. 10, 637-40.

In 1950 Dr. Neghme and his colleagues recorded the first case of human infestation by *D. latum* in Chile [this *Bulletin*, 1950, v. 47, 1107]. Inquiries into this case led to the conclusion that an endemic focus very probably existed about Lake Colico, and examination of the faeces of 81 persons living on the shores of the lake revealed one infested, and of 6 *Salmo irideus* caught in the lake 3 were infested with plerocercoids.

Fresh studies were undertaken in July 1950 and February 1951 and quite a large number of *S. irideus* and *S. fario* from various lakes and rivers of southern Chile were harbouring the larva, more in the abdominal cavity than in the viscera or muscles. Fish from 11 rivers and lakes were examined and of 441 salmon (*S. irideus* and *S. fario*) 119 (26.9 per cent.) were infested, whereas of 43 trout (*Percichthys trucha*) none was infested. Dogs and cats are the chief reservoir hosts. As regards human cases, 3,369 persons had their faeces examined and 21 were positive; 10 out of 839 from Lake Colico, 7 of 208 from Lake Riñihue. Treatment by atebrin [mepacrine] was adopted in 8 cases with uniform success. With regard to symptoms, so many patients were infested with other parasites, amoebiasis among them, and also suffering from endemic goitre, that it is not possible to say to what extent any symptoms present were due to the helminth; severe anaemia was not one of the symptoms present.

The authors conclude that *Diphylllobothrium* infestation has spread to other regions of central and southern Chile and conditions in general are favourable to the spread, for copepod crustacea and many species of *Salmonidae* abound in the sweet water collections. Preventive measures are obvious: prohibition of defaecation in or close to watercourses and lakes, of giving garbage and raw viscera of fish to cats and dogs, destruction of fish found parasitized, treatment of those infested and, of course, propaganda and education. H. Harold Scott

See also p. 537, BJÖRKENHEIM, Neurologiska fynd vid pernicios maskanemi. [**Neurological Findings in Pernicious Tapeworm Anaemia**]

TELKKÄ, A., WAHLSTRÖM, S. & KOULUMIES, R. **Eosinophil Response to ACTH and Adrenaline in Patients infested with Fish Tapeworm (*Diphyllobothrium latum*)**. *Ann. Med. Intern. Fenniae*. Helsinki. 1951, v. 40, No. 4, 305-10, 2 figs. [15 refs.]

"The Thorn eosinophil test was performed on 33 persons infested with the fish tapeworm by using both adrenaline and ACTH. Twelve of these patients suffered, in addition, from macrocytic diphyllobothrium anaemia. The control test was performed by using saline.

"It is apparent from the results that the majority of the patients give a normal result, i.e. a fall of over 50 per cent. This becomes even clearer with ACTH than with adrenaline. In patients suffering from anaemia the response is somewhat weaker than in patients with ordinary fish tapeworm disease. Thus, the latter group responds to a great part to adrenaline and ACTH in the same way as normal persons do. There are, however, fairly numerous exceptions without clinical symptoms of adrenal insufficiency. In control tests using saline injections an average fall of 22 per cent was registered in the number of eosinophils. In four cases the fall exceeded 50 per cent."

BRUMMER, P. Resultat av maskfördrivning hos anemiska och icke-anemiska maskbärare. [Results of Worm Cures in Fish-Tapeworm Carriers with and without Anaemia] *Nordisk Med.* 1951, Dec. 12, v. 46, No. 50, 1862-3.

The English summary appended to the paper is as follows :—

"The author has investigated the efficacy of a worm cure in fish-tapeworm carriers with and without pernicious anemia. The results showed that worm cures with filicin in anemic worm carriers apparently failed in 30.9 per cent, i.e., no worms were seen to be excreted. A follow-up, however, showed that the treatment had been successful. In worm carriers without anemia failure occurred more seldom (in 11.9 per cent). This difference should be viewed in the light of VON BONSDORFF's investigations, according to which the worm in worm carriers with anemia lives higher up the intestines than in patients without anemia. Therefore the worm can be destroyed and digested more easily in the intestines during the cure in the former group than in the latter."

SODEMAN, W. A. & JUNG, R. C. **Treatment of Teniasis with Quinacrine Hydrochloride**. *J. Amer. Med. Ass.* 1952, Jan. 26, v. 148, No. 4, 285-6.

The authors treated 11 patients suffering from *Taenia saginata* infection with quinacrine [mepacrine] hydrochloride.

Each patient had milk diet on the day before treatment and usually a purge of castor oil or magnesium sulphate. A saline enema was given on the morning of treatment : an hour later the patient was given 0.6 to 0.8 gm. of quinacrine hydrochloride, according to age and size. [The first patient received 1.2 gm. but the upper limit was reduced to 0.8 gm. because of the nausea sometimes produced.] Two 0.1 gm. tablets of quinacrine were given every 5 minutes, with a little water, until the entire dose had been taken. If it was expected that nausea might occur, sodium bicarbonate was added to the water. Two to four hours later the purge was repeated and no food given until a bowel movement was obtained.

The authors followed the procedure adopted by other workers, but they doubt whether the milk diet is necessary and speculate whether purges other than castor oil or magnesium sulphate may be more desirable.

In 10 of the patients, the treatment was effective on initial trial and the entire worm was passed in each case. In the eleventh patient, who was subject to severe constipation, the drug was vomited. Three months later the quinacrine was repeated, together with sodium bicarbonate and, followed by large doses of three purgatives; the entire worm was then passed.

The authors believe that quinacrine appears to be the drug of choice in the treatment of *T. saginata* infestation. The only toxic reactions were nausea and vomiting which were generally controlled with ease. [See also this *Bulletin*, 1950, v. 47, 255.] *H. J. O'D. Burke-Gaffney*

PILOTTI, M. & FAIGUENBAUM, J. Sobre las localizaciones del quiste hidatídico. [**Localization of Hydatid Cysts**] *Bol. Informaciones Parasitarias Chilenas*. 1951, Oct.-Dec., v. 6, No. 4, 55-7. [15 refs.]

The English summary appended to the paper is as follows:—

"The author performed a revision of the statistic services of the Hospitals of Chile and found over 1,595 human cases of hydatid cyst diagnosed from 1945 to 1950, that 786 were located in lungs (49.3%) and only 582 in the liver (36.5%)."

LINDQUIST, W. D. **Infections of *Ancylostoma caninum* in Abnormal Hosts.** *J. Parasitology*. 1952, Feb., v. 38, No. 1, 80-82, 4 figs.

"Studies were made of cellular reaction to infective larvae of *A. caninum* in the lungs and skin of both cotton and laboratory rats.

"The cellular reaction appeared the same in both hosts with encapsulation of the larvae in the skin but not in the lungs at 26 hours after infection.

"Failure to get lung encapsulation may be due to a difference in the life cycle of *A. caninum* from that of *Nippostrongylus muris* which was shown in previous work to be encapsulated in the lung of the cotton rat."

FLEURY, C. T. Sobre um caso fatal de "Strongyloidiasis". [**A Fatal Case of Strongyloidiasis**] *Rev. Inst. Adolfo Lutz*. São Paulo. 1944, Dec., v. 4, Nos. 1/2, 207-9, 4 figs. on 2 pls.

CORRÊA, M. O. A. Considerações em torno da ocorrência de ovos de helmintos da família *Trichostrongylidae* (Leiper, 1912) em fezes humanas. [**On the Presence of *Trichostrongylidae* Ova in Human Faeces**] *Rev. Inst. Adolfo Lutz*. São Paulo. 1948, v. 8, 87-98, 4 figs. on 2 pls. [11 refs.]

This is a subject rather of academic than of practical importance, because the treatment of these infestations is the same as for hookworms. Academically, however, the question is certainly important. The fact that worms of this family can infest man is not generally known and since the ova in many respects resemble those of ankylostomes they are usually diagnosed as the latter. In the same way that most microscopists cannot distinguish ova of *Ancylostoma* from those of *Necator*, so many cannot differentiate those of *Trichostrongylus* from those of *Haemonchus*. Part of the present article deals with systematology: of the super-family *Strongyloidea* Weinland, the family of *Trichostrongylidae* Leiper, the sub-family *Trichostrongylinae* Leiper and the genera *Trichostrongylus*, *Haemonchus*, *Ostertagia* and others. *Trichostrongylus* is a parasite of the stomach and small intestine of goats and cattle, often, in Brazil, in association with *Ostertagia*. It is not rare in man and may cause symptoms like those of hookworm infestation. The author quotes a large number of records from the literature giving the prevalence of infection in

various countries, a few of which may be mentioned : from 9.1 to 25 per cent. by Maplestone among workers in Bengal tea-gardens ; 1.1 per cent. of 15,578 faecal examinations at the Calcutta School of Medicine (Maplestone) ; 10 per cent. of Africans in the Belgian Congo (Van Slype) ; 8 per cent. in Mauritius (Webb) ; among " normal children " in Keijo, Chosen, 24.4 per cent. were harbouring *Trichostrongylus orientalis* and ankylostomes ; lastly, 2.1 per cent. of Japanese immigrants into São Paulo were infested. The author gives a list showing that in the 7 years 1942-48 inclusive, of 46,951 faeces examined worm infestations were found in 29,330 (62.4 per cent.) and *Trichostrongylus* was found 75 times. The dimensions, limits and average, given show that the ova of *Trichostrongylus* are longer but less broad than ankylostomes, but the differences are not great—81 to 104 microns in length as compared with the ankylostome average of 62 microns, and 40-48 microns wide as compared with 40.8 microns (average of 20 measurements). The average dimensions of 115 *Trichostrongylus* ova were 91.3×43.9 microns.

Heterodera infestations have been reported in man solely on the finding of the ova in the faeces ; but these have come from ingestion of root vegetables, radishes, turnips, celery, beetroot and the like on which *Heterodera* is parasitic, the larvae and ova being freed in the intestine of man but man is not believed to be a host of the worm itself.

H. Harold Scott

APARICIO GARRIDO, J. & PRIETO LORENZO, A. Presencia de huevos de " *Heterodera Marioni* " (Cornu, 1879) Goodey 1932, en heces. Necesidad de su conocimiento en orden a posibles errores diagnósticos. [**Ova of *Heterodera marioni* in Human Faeces**] *Med. Colonial*. Madrid. 1952, Feb. 1, v. 19, No. 2, 119-24, 2 figs.

The authors stress the possible presence of these ova in human faeces, stating that the knowledge is necessary if diagnostic errors are to be avoided. In the course of a few days, when examining the faeces of 5 workers in vegetable gardens for helminthic infestation the authors found, besides ova of *Enterobius vermicularis*, *Ancylostoma duodenale* and *Trichuris trichiura*, others resembling one or other of these, but rather longer and with flatter sides, not operculated, sometimes slightly curved, " banana-shaped " (*con tendencia a la forma de plátano*). They recognized these as probably ova of *Heterodera*, a normal parasite of root crops, and anthelmintic treatment led to the passage of the other helminths, but not of any adult worms corresponding to these ova—evidence that the ova were not those of a worm pathogenic to man. It is important that this should be known or erroneous diagnoses of helminth infestation may be made and treatment adopted unnecessarily.

H. Harold Scott

BEAUTYMAN, W. & WOOLF, A. L. **An Ascaris Larva in the Brain in association with Acute Anterior Poliomyelitis.** *J. Path. & Bact.* 1951, Oct., v. 63, No. 4, 635-47, 14 figs. (13 on 5 pls.) [44 refs.]

The authors' summary is as follows :—

" 1. An encapsulated ascarid larva was found in the thalamus of a child who died with clinical and morbid anatomical evidence of poliomyelitis.

" 2. There was histological evidence of migration of larvae through the cerebral vessels.

"3. The poliomyelitis principally affected the cervical segments of the spinal cord and the nuclei of the brain stem.

"4. The manifestations of larval migration of ascaris through the brains of animals, the possible relationship between the larval migration and the development of poliomyelitis and the cause of neurological symptoms in ascariasis are discussed."

This paper is a valuable contribution to a possibly important, although little understood, subject. Its chief interest lies in the authors' extensive survey and critical discussion of the relevant literature.

R. M. Gordon

CAVIER, R. L'équipement enzymatique du liquide coelomique de l'*Ascaris* du porc, *Ascaris lumbricoides*, Linné 1758. [The Enzyme System in the Coelomic Fluid of Pig *Ascaris*] *Bull. Soc. Chimie Biol.* 1951, v. 33, No. 10, 1391-9 [20 refs.]

NAGAI, A. [Influence of the Anthelmintics on the Egg-laying Capacity of the Pig *Ascarids* in Vitro] (Report III.) *Osaka Daigaku Igaku Zasshi* [Med. J. Osaka Univ.: Japanese Edit.] 1951, June, v. 3, No. 4, 335-43.

The English summary appended to the paper is as follows:—

"1. The average length of the survival of the ascarids reared in 1/20,000 Hexylresorcinol 1% saline solution at 30°C and 38°C were 3.6 days and 2.1 days respectively. The eggs were laid better at 38°C, but in each case the decrease of egg-laying capacity was seen.

"2. On the second day of rearing in the saline solution at 38°C, ascarids were immersed in 1/20,000 Hexylresorcinol, holding it at 38°C for the period of 3 hours and 6 hours respectively, and it was found in the former case, no effects were brought upon the days of survival but egg-laying capacity was found to have been lessened and then a tendency for the revival of their egg-laying capacity was found, and in the latter case the length of their survival is affected and consequently shortened, and their egg-laying capacity was also found to have been decreased and subsequently no indication was recognized that it could be revival."

QAZILBASH, N. A. A Note on the Gravimetric Determination of Santonin. *J. Pharmacy & Pharmacol.* London. 1952, Feb., v. 4, No. 2, 103-8. [34 refs.]

POIRIER, M. & DESCHIENS, R. Sur une modalité de la technique de coloration des microfilaires. Méthode panoptique. [Method of Panoptic Technique for Staining Microfilariae] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 11/12, 748-9.

The author describes a simplified technique for staining microfilariae in blood.

Thick films are stained for 10 minutes in a solution of Giemsa's stain (5 drops to 10 cc. of distilled water at pH 7). They are then placed, without being allowed to dry, into another Giemsa solution (50 drops to 10 cc.) and left to strain for 15 to 20 minutes. They are then dried and examined. The nuclei and (in the case of *W. bancrofti*) the sheaths of the embryos are well stained.

For thin films, the preparations are fixed in May-Grünwald solution (15 drops for 3 minutes, then 15 drops of distilled water for 1 minute). The solution is then flushed off and the films are stained for 20 minutes in Giemsa solution (50 drops to 10 cc.).

H. J. O'D. Burke-Gaffney

SCHNEIDER, J. État actuel de la thérapeutique de la filariose à *F. loa* par le 1-diéthyl-carbamyl-4-méthyl-pipérazine. [**Present Position of Treatment of Loiasis with Hetrazan**] *Acta Tropica*. Basle. 1951, v. 8, No. 4, 345-59. [20 refs.]

A general review.

PAN AMERICAN SANITARY BUREAU. Publication No. 242. 1950, Mar., pp. vii+339. **Bibliography of Onchocercosis** (Includes Selected Studies to June 1945).

This bibliography, which includes selected work up to June 1945, was compiled under the direction of Dr. Joseph S. Spoto, Chief of the Guatemala Office of the Pan American Sanitary Bureau from 1946 to 1947. It forms part of a research programme concerned with the control of onchocerciasis in Guatemala and Mexico. Acknowledgement is made of the several sources from which information was obtained.

The references are listed alphabetically under authors' names. Although a proportion of entries are titles only, the majority are abstracts varying in length from a few lines to nearly a page. All these abstracts are given in English and in Spanish. There are 1,422 main entries and an appendix lists 293 more. There is an author index of 8 pages and 6 pages of subject index.

The compilation has obviously entailed much painstaking work and those responsible are to be congratulated on covering so wide a field as the subject of onchocerciasis, its parasites, vectors, epidemiological and clinical aspects. An example of the wide range of references is reflected in the fact that the list of species of *Simulium* occupies no less than 3 pages of the subject index.

The bibliography will be of great use to those seeking information on the literature of onchocerciasis up to 1945, even though this excludes availability of references to recent important work such as that on hetrazan.

H. J. O'D. Burke-Gaffney

ROSEN, E. **Cortisone Treatment of Trichinosis**. *Amer. J. Med. Sci.* 1952, Jan., v. 223, No. 1, 16-19, 1 fig.

"1. Cortisone therapy appeared to be of striking benefit in a moderately severe case of trichinosis.

"2. Further clinical trials of cortisone and ACTH are warranted in this disease."

FRANK, J. F. **A Study on the Incidence of Trichinosis in Wild Rats in the Maritime Provinces**. *Canadian J. Comp. Med.* 1951, Dec., v. 15, No. 12, 279-83. [12 refs.]

"The examination of diaphragms of 460 rats collected from various points in three of the Maritime provinces revealed the presence of larvae of *Trichinella spiralis* in 20 rats or 4.35 per cent. The rats originated from 64 different premises. Eleven of these, six garbage dumps and five abattoirs, were found to contain infected rats. It appears from these findings that, in a survey of this type, the overall percentage of infection found in rats would depend greatly on the origin of the rats and the possibility of their frequenting premises where they might have access to raw pork scraps."

DEFICIENCY DISEASES

DE CASTRO, J. Les problèmes de l'alimentation dans les régions tropicales. [Nutrition Problems in Tropical Countries] *Bull. Soc. Sci. d'Hyg. Alimentaire.* 1948, v. 36, Nos. 1, 2 & 3, 11-29.

AUTRET, M. Le problème alimentaire en Indochine. [Nutrition Problems in Indochina] *Bull. Soc. Sci. d'Hyg. Alimentaire.* 1948, v. 36, Nos. 10, 11 & 12, 294-325, 2 figs.

SIMPSON, I. A. **The Distribution of Thiamine and Riboflavine in Rice Grains : with a Study of the Changes that occur in the Distribution of Thiamine during the Process of Parboiling Rice.** *Bull. Inst. Med. Res. Fed. Malaya.* 1951, N.S. No. 6, 19 pp., 26 figs. on 11 pls. [13 refs.]

"1. A photographic method for the location of thiamine and riboflavine in cereal grains, first described by Somers *et al.*, in the case of wheat, has been applied to the rice grain.

"2. The results obtained confirm that the highest concentration of both thiamine and of riboflavine exists in the germ or embryo ; but, whereas thiamine is largely concentrated in the scutellum, riboflavine appears to be more uniformly distributed throughout the tissues of the embryo.

"3. The method has been applied to observe the changes that occur in the distribution of thiamine in rice grains when they have been subjected to various processes of parboiling ; and the results show that, under certain conditions, considerable diffusion of thiamine into the endosperm takes place."

THOMSON, J. & KEAY, K. R. **A Case of Acute Beriberi complicating Polyserositis in Britain.** *Brit. Med. J.* 1952, Feb. 9, 295-8, 1 chart. [13 refs.]

"A case of multiple vitamin deficiency presenting the clinical picture of acute beriberi is reported in a patient suffering from polyserositis, possibly of tuberculous origin.

"It is suggested that the toxic process causing the polyserositis also produced the beriberi symptoms.

"No similar case has been discovered in the British literature."

BERVOETS, W. P. Note préliminaire à l'étude de l'aribo flavinose à Léopoldville. [A Preliminary Note on a Study of Ariboflavinosis in Léopoldville] *Ann. Soc. Belge de Méd. Trop.* 1951, June 30, v. 31, No. 3, 325-9.

At a school for African children at Léopoldville it was noticed that many children complained of a burning sensation in the mouth, either spontaneous or on ingestion of *pili-pili* (*Capsicum frutescens*). It was found that many of these children presented signs of glossitis of varying degrees.

At first there was only a circumscribed glossalgia, limited to the edges and point of the tongue, on ingestion of peppery or acid substances ; this was associated with a localized swelling, which later spread to the rest of the tongue so that the indentation caused by the teeth persisted and there was loss of papillae, leaving shiny smooth red areas which eventually coalesced and involved the whole surface of the tongue. In the severest cases this was accompanied by a general stomatitis, a diffuse redness of the buccal mucosa with here and there an opalescent spot of varying size, fissuring of the tongue, general swelling of the whole buccal cavity, and pyorrhoea.

Of 2,660 children examined 986 (37.08 per cent.) showed this clinical picture in a greater or less degree. Of 62 females attending a baby clinic 29, or 46.77 per cent., showed this condition, but none of the babies. There was other evidence of vitamin B₂ deficiency in many of these cases; *e.g.*, angular stomatitis in 32.6 per cent. and scrotal dermatitis in 29.1 per cent. The percentage incidence increased up to the age of puberty; at 8 years 21.59 per cent. were affected compared with 50.74 per cent. at 14/15 years.

Children with this condition were divided into 3 groups of 50 each. Group 1 children were given 25 mgm. of riboflavin divided into five doses of 5 mgm. injected at twenty-four-hour intervals: 8 days after the last injection it was found that 64 per cent. were completely cured and in the rest the condition was improved. Group 2 children were given a gramme of yeast daily for 10 days: 8 days after the last dose 16 per cent. were cured, 24 per cent. improved, 52 per cent. were stationary and 8 per cent. had deteriorated. In the third, the control, group, 58 per cent. had not changed and 42 per cent. had deteriorated slightly.

L. E. Napier

JACOBS, E. C. **Oculo-Oro-Genital Syndrome: a Deficiency Disease.** *Ann. Intern. Med.* 1951, Nov., v. 35, No. 5, 1049-54. [19 refs.]

This paper describes a deficiency disease in which the principal features were an exfoliating dermatitis of the scrotum, stomatitis and conjunctivitis which appeared insidiously in more than 75 per cent. of 8,000 American prisoners of war after 6 months on an inadequate rice diet in the Philippines during 1942. The symptoms improved rapidly in December, 1942, and January, 1943, when each prisoner received two Red Cross parcels (11 pounds each). The symptoms recurred again, but to a much smaller extent, when the diet again became minimal. Most of the prisoners had then lost much weight, and it is suggested that this was associated with a reduction of the minimum requirements of the vitamin B₂ complex.

R. Passmore

LEIGH, D. **Pellagra and the Nutritional Neuropathies: a Neuropathological Review.** *J. Mental Sci.* 1952, Jan., v. 98, No. 410, 130-42, 4 figs. [27 refs.]

The clinical and neuropathological findings are described in 14 fatal cases of pellagra occurring in inmates of British mental hospitals. In each case the diagnosis of pellagra was based on (1) loss of weight, (2) diarrhoea, and (3) dermatitis, characteristically of the exposed parts, hands, legs and face, which in 6 of the patients had been precipitated by exposure to the sun. Most of the patients had lived many years in mental hospitals.

In only 3 of the patients was there clinical evidence of an organic neurological lesion, but in all 14 there were remarkably uniform histological changes in the central nervous system. This consisted of a retrograde cell degeneration of the Betz cells of the pre-central cortex. The Nissl bodies had disappeared from the centres of the nerve cells, layers of chromatin substance remaining peripherally and the nuclei becoming eccentrically displaced. Similar lesions were found frequently but not constantly affecting the cells of the pontine, dorsal vagal, gracile and cuneate nuclei.

It is considered that many of the complications of pellagra, such as retrobulbar neuropathy and deafness, are separate syndromes with a separate nutritional aetiology.

The paper includes a useful review of the literature of the neurohistology of nutritional disorders.

R. Passmore

CONCHA, Eliseo. Estudios de laboratorio en la pelagra. Excreción urinaria de vitaminas del complejo B y niveles plasmáticos de caroteno, vitamina A y ácido ascórbico. [**Laboratory Studies on Pellagra. Urinary Excretion of B Vitamins, Plasma Levels of Carotene, Vitamin A and Ascorbic Acid**] *Rev. Med. Chile.* 1951, Oct., v. 79, No. 10, 626-30. [17 refs.]

These observations were carried out on 15 pellagra patients, 14 males and 1 female, their ages ranging between 36 and 70 years and the duration of disease prior to their coming into hospital, 15 days to one year. Thirteen of the 15 had been accustomed to imbibe largely of wine. Two presented cutaneous symptoms only; 7 cutaneous and digestive symptoms, especially diarrhoea; 5 cutaneous and psychic symptoms—disorientation, apathy and mental hebetude, and one had cutaneous, digestive and psychic symptoms. Three presented "pyramidal" signs, paresis of the legs, muscle hypertonia, exaggerated tendon reflexes and extensor Babinski reflex; 4 had a moderate peripheral neuritis, probably due to a vitamin B deficiency; 4 showed cheilosis, angular stomatitis and blepharo-conjunctivitis—signs of ariboflavinosis; 2 had a concomitant hepatic cirrhosis and 2 an associated pulmonary tuberculosis, one ending fatally.

Examinations included the excretion of thiamine, riboflavin and methyl-nicotinamide in the urine, estimation of the blood pyruvic acid, the plasma carotene, vitamin A and ascorbic acid, the serum proteins and the concomitant anaemia.

As so many tests were carried out on these patients, a detailed account would become little more than a catalogue and we can best present the findings as a summary. The excretion of members of the vitamin B complex was very variable and so is of little value as a gauge of individual cases. The pyruvic acid in the blood was increased in 2 of those patients with polyneuritis. Taking the limits of 0.77 and 1.3 mgm. per 100 cc. as normal, 5 showed a concentration above 1.3 mgm. The carotene, vitamin A and ascorbic acid was investigated in 13 patients and, generally, these were below normal, but one, with follicular hyperkeratosis had the normal vitamin A concentration of 21 mgm. per 100 cc., proving that the hyperkeratosis was not due to deficiency in this vitamin. Serum protein was estimated in 10 patients and varied between 4.4 and 7.2 gm. per cent. and, generally speaking, there was a small diminution. Most of the patients had a moderate degree of anaemia: three had red corpuscles over $4\frac{1}{2}$ million per cmm., 6 had between 4 and 4.2 million, the other 6 had 3.1 to 3.9 million. Haemoglobin ranged between 65 and 78 per cent. in 6 and 80 per cent. or more in the other nine. The degree of anaemia is, therefore, "moderate and inconstant".

H. Harold Scott

SQUIRES, B. T. **Ascorbic Acid Content of the Milk of Tswana Women.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Jan., v. 46, No. 1, 95-8.

"(1) The ascorbic acid content of milk from 84 Tswana mothers of the Bechuanaland Protectorate was estimated.

"(2) The mean content of samples collected during the dry season was 1.7 mg./100 ml.; of those collected during the rainy season, when indigenous fruit and vegetables are available, it was 2.9 mg./100 ml.; the mean content over the whole year was 2.4 mg./100 ml.

"(3) In comparison with European and American findings and theory, the maternal output and infant intake of ascorbic acid are much below normal, but none of the mothers or babies showed any signs of ascorbic acid deficiency at any time whilst under observation."

HOLMES, E. G., STANIER, M. W., SEMAMBO, Y. B. & JONES, E. R., with the assistance of J. KYOBE, and a statistical note by F. L. GEE. **An Investigation of Serum Proteins of Africans in Uganda.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Dec., v. 45, No. 3, 371-82, 2 graphs. [23 refs.]

The serum protein levels of Africans attending Mulazo Hospital, Kampala, for minor constitutional or surgical conditions were examined. The albumin values were lower and the globulin values higher than those accepted as "normal"—the A/G ratio was less than unity. A definite correlation was observed between the red cell count and the serum proteins, albumin and A/G ratio rising and total globulin falling with increase in red cell count. This fall in globulin is mainly due to a fall in β -globulin, the values for α - and γ -globulin being substantially unchanged. The α - and γ -globulin values obtained are notably higher than those recorded in the literature and also exceed those found for Europeans resident in Kampala.

J. H. Birkinshaw

DELON, Jeanne. La maladie oedémateuse du sevrage. Nouveaux examens et rapports avec certains états carentiels des pays chauds. [**Oedema Following Weaning. New Investigations of Certain Deficiency Diseases in the Tropics**] *Maroc Méd.* 1951, June, v. 30, No. 313, 578-83.

This paper from Casablanca in French North Africa describes individual case histories of 12 children aged 1-2 years suffering from oedema and multiple vitamin deficiency diseases. The author states they resemble the kwashiorkor as described originally by WILLIAMS. Milk and milk preparations were valuable in treatment, but preparations of vitamin A and the B group of vitamins were also necessary. Many of the children were gravely ill and 8 died despite the therapeutic measures.

R. Passmore

HANAFY, M. **Malnutrition in Egyptian Infants.** *J. Roy. Egyptian Med. Ass.* 1951, v. 34, No. 7, 470-76. [18 refs.]

This paper from Farouk University in Alexandria describes the treatment of children suffering from malnutrition, who presented a clinical picture similar to that described by WILLIAMS in 1933 in West Africa as kwashiorkor. The most effective measure is the provision of suitable dietary proteins. A sour milk preparation (yoghourt) made from buffalo's milk, cheese made from skimmed milk and sieved boiled beans were found to be most successful.

R. Passmore

BLANKHART, David Meskes. Voeding en leverziekten op het eiland Sangir in Indonesië. [**Nutrition and Liver Diseases in the Isle of Sangir in Indonesia**] 159 pp., 1 map, 2 charts, 1 text fig. & 6 figs. on 2 pls. English summary. 1951. Rotterdam : C. Hartog Jr.

Part I and II consist of a review of the literature of the liver and nutritional disorders in experimental animals and in other parts of the world. Part III is concerned with findings on the Isle of Sangir. Diet surveys have shown that the chief food is sago and tuberous plants. Additional foods consisted of fish, the pulp of coconuts, vegetables and fruit. Little or no milk is available either for children or adults. The energy content of the diet is probably sufficient (2,000 calories per head per day) but the quantity of protein (26 gm. per head per person per day) is totally inadequate.

Up to 5 per cent. of the patients admitted to hospital in the capital, Taruna, were suffering from liver cirrhosis, and 296 cases were seen between 1946 and 1949. Of these, 70 per cent. were under 20 years old.

Seventeen autopsies were done : in early cases in young children a pure fatty infiltration of the liver was found and in cases of longer duration a cirrhosis of the Laënnec type. No association of the liver changes was found with any of the numerous infections common on the island, but the changes were closely associated with the poor diet and notably with inadequate protein intake and perhaps also an insufficiency of the vitamin B complex.

[From the English summary it would appear that this is a workmanlike monograph, and credit is due to the author for carrying out his task under what must obviously have been very difficult conditions for accurate observations.]

R. Passmore

HAEMATOLOGY

PIETERS, G. Service de transfusion sanguine pour nourrissons congolais en zone rurale. [Blood Transfusion Service for Infants in a Rural Area of the Belgian Congo] *Ann. Soc. Belge de Méd. Trop.* 1951, Dec. 31, v. 31, No. 6, 661-82, 1 fig. & 3 pls. [11 refs.]

The use of this service includes the treatment of severe anaemias and especially that form resulting from malaria.

TROWELL, H. C. Pernicious Anaemia and Macrocytic Anaemia in Africans in Uganda. *Lancet.* 1951, Oct. 27, 761-3. [18 refs.]

In a preliminary discussion the author points out that there are several types of macrocytic anaemia in Africans, some due probably to dietary deficiencies and others to parasitization (*sensu lato*) and yet others to both conditions, but that a very common form in Uganda is a slightly macrocytic normochromic or slightly hypochromic anaemia. Some of these macrocytic anaemias are associated with histamine-fast achlorhydria, but this does not mean that they are pernicious anaemia, because the tongue is not sore, there is usually no icteric tint of the conjunctivae, the bone marrow is not megaloblastic, there is no response to vitamin B, refined liver extracts, or folic acid, once cured these cases do not relapse, and subacute combined degeneration never occurs.

The author then describes a case of macrocytic anaemia in an African which he considers is pernicious anaemia.

The patient was an African of pure Ganda stock, aged 43, a peasant cultivator. His symptoms were mainly those of anaemia ; he occasionally had a sore tongue, but never paraesthesia of the limbs, abdominal symptoms, diarrhoea or bulky stools. He was moderately well nourished and very anaemic ; he had slightly yellow sclerotics and a red raw tongue smooth on the upper surface and edges, but no nervous symptoms. His blood showed a slight macrocytic (MCV=102 μ), orthochromic (MCHC=31.1 per cent.) anaemia (haemoglobin =3.8 gm. per 100 ml., R.B.C.=1.20 million per cmm.). The bone marrow showed typical megaloblasts.

There was no response to iron, but a reticulocyte crisis occurred (28.4 per cent.) 8 days after a large single injection (10 ml.) of liver extract (Armour) and a gradual rise occurred in haemoglobin and red cells to 15.86 gm. and 4.42 millions, respectively. At the same time the marrow became normoblastic. The mean corpuscular volume rose with the reticulocyte count and then fell (more slowly) to 109 μ .

Within the next 2 months a gradual deterioration in the clinical picture commenced and the haemoglobin and red cell count fell to 10.50 gm. and

2.76 millions, respectively, and a sternal puncture showed a megaloblastic marrow again. Folic acid was given and a slight improvement followed; later, when vitamin B₁₂ was given in doses of 40 μ gm. there was a slightly more marked improvement to 13.90 gm. of haemoglobin and 4.07 millions red cells with only a slight reticulocyte rise. The mean cell volume was finally 107 μ .

A test meal showed histamine-fast achlorhydria on two occasions. [While there are many features in this case suggestive of pernicious anaemia, it was far from a classical case.]

L. E. Napier

BJÖRKENHEIM, G. Neurologiska fynd vid perniciös maskanemi. [**Neurological Findings in Pernicious Tapeworm Anaemia**] *Nordisk Med.* 1951, Dec. 12, v. 46, No. 50, 1860-62.

The English summary appended to the paper is as follows:—

"In 75 out of 95 patients with pernicious tapeworm anaemia (79 per cent) subacute combined degeneration of the spinal cord and peripheral nerve degeneration was found. Paraesthesias disturbances of motility and co-ordination, and impairment of the deep sensibility were the most common neurological manifestations. In 34 cases the capacity for work was reduced by the nervous lesion. Expulsion of the worm resulted in extensive, frequently even complete, remission of the neurological manifestations. Additional treatment with liver extract or vitamin B₁₂ did not yield better results than a worm cure alone. Progression of the neurological involvement was observed under treatment with folic acid and also in recurrences of pernicious tapeworm anaemia. Neurological manifestations were equally common in pernicious tapeworm anaemia and in cryptogenetic pernicious anaemia. They were equally severe in recent cases of cryptogenetic pernicious anaemia as in patients of the same age suffering from pernicious tapeworm anaemia. In recent adequately treated cases of cryptogenetic pernicious anaemia the neurological remission was nearly as extensive as in pernicious tapeworm anaemia. It is assumed that neurological disturbances in pernicious tapeworm anaemia result when the tapeworm absorbs neurotropically active substances."

BAKER, S. J. & O'NEILL, J. J. M. **Cooley's Anaemia: a Review and Presentation of an Affected Family.** *Med. J. Australia.* 1951, Oct. 20, v. 2, No. 16, 527-31, 11 figs. (7 on pl.) [16 refs.]

The authors consider that Cooley's anaemia is probably more common in Australia than is generally supposed. The major form of the disease shows 5 characteristic features: racial incidence, familial incidence, splenomegaly, typical haematological changes and skeletal changes.

They describe 5 cases in an Australian family that had recently migrated from Sicily; one infant had a major form of the disease and the other 4, the parents and the paternal grand-parents, had the minor asymptomatic form (the trait).

Case I was a three-months-old baby with a distended abdomen containing a huge liver and a huge spleen, palpable glands in the neck, and a few scattered petechiae on the abdominal wall.

The blood showed anisocytosis, poikilocytosis and polychromasia, many primitive white and red cells, a haemoglobin percentage of 7.2 grammes per 100 cc., 2,600,000 red cells, 28,000 white cells and 10,000 nucleated red cells per cmm. The bone marrow was hyperactive and normoblastic with an erythroid: myeloid ratio of 1:1. The serum bilirubin was 1.4 mgm. per 100 ml. The blood group of both patient and mother was A, Rh(D)-positive.

"Radiologically the skull was within normal limits. The mandible was poorly ossified. The long bones were rather broad, with deficient modelling on relative expansion of the metaphyseal ends, thinned and 'layered' cortex and rather deficient spongy bone, particularly at the wrists, knees and ankles."

Improvement in the blood picture followed transfusion, on 3 occasions, but the condition relapsed.

Examination of the other 4 cases showed no clinical abnormality. Examination of the blood films of all four showed some anisocytosis, poikilocytosis and stippling of the red cells, but no nucleated red cells. Fragility tests in hypotonic saline showed an increased span of haemolysis and decreased fragility. Radiological examination of the skulls, forearms, hands and femurs showed no abnormality.

The paper is illustrated by 11 figures.

L. E. Napier

SINGER, K. & CHERNOFF, A. I. **Studies on Abnormal Hemoglobins. III. The Interrelationship of Type S (Sickle Cell) Hemoglobin and Type F (Alkali Resistant) Hemoglobin in Sickle Cell Anemia.** *Blood*. 1952, Jan., v. 7, No. 1, 47-52, 1 fig. [10 refs.]

"1. It could be demonstrated that of the three tested types of human hemoglobin—N (normal adult), S (sickle cell) and F (fetal)—only the reduced S compound shows tactoid and gel formation in sufficiently concentrated solutions. These physico-chemical phenomena may be used for the qualitative identification of S hemoglobin.

"2. The alkali resistant hemoglobin fraction, present in sickle cell anemia erythrocytes (but not in trait red cells), was concentrated in purified form. No tactoid or gel formation could be elicited. Therefore, this alkali resistant pigment does not appear to be a variant of S hemoglobin. It seems probable that sickle cell anemia erythrocytes contain two separate types of pathologic hemoglobin (S and F) which are not directly related to each other."

BRANSON, H. & BANKS, L. O. **The Turnover Time of Phosphorus in Normal, Sickle Cell Trait, and Sickle Cell Anemia Blood in Vitro as measured with P³².** *Science*. 1952, Jan. 25, 89-90.

PATTERSON, R. H., WILSON, H. & DIGGS, L. W. **Sickle-Cell Anemia: a Surgical Problem. II. Further Observation on the Surgical Implications of Sickle-Cell Anemia.** *Surgery*. 1950, Aug., v. 28, No. 2, 393-402, 5 figs. [25 refs.]

Of 142 cases of sickle-cell anaemia admitted to the John Gaston Hospital, Memphis, Tenn., 17 were admitted as surgical cases and 12 others were diagnosed as probably surgical. Acute appendicitis, intestinal obstruction, renal colic, pelvic inflammatory disease and acute peritonitis were the conditions usually supposed to be present in these patients until examination of the blood cleared up the diagnosis. The present paper deals with other surgical conditions for which this disease may be mistaken.

Approximately 10 per cent. of Negroes inherit a condition known as sickle-cell trait and 1 in 40 of these have sickle-cell anaemia. Jaundice of a haemolytic type is usually clinically demonstrable and there may be severe liver damage. Symptoms usually commence in infancy, with recurrent febrile attacks, pain in bones or joints simulating acute rheumatism or abdominal symptoms suggesting acute surgical conditions, chronic leg ulcers, early enlargement of spleen and liver, enlarged heart with systolic murmur and radiological changes in bones. The symptoms and signs are partly due to anaemia, but also to

occlusive vascular phenomena, as there is increased viscosity of the blood with retardation of blood flow. Vasospasm, vascular blocking with sickled cells, or thromboses in brain or cord may produce headaches, convulsions, paralyses or psychotic changes, for which the neuro-surgeon's aid may be invoked. Of 142 patients, 57 showed signs or symptoms referable to the central nervous system. The cerebrospinal fluid may show increased pressure, neutrophilic pleocytosis and increase of protein, or may be normal. There were 7 fatal cases among the 57 who showed central nervous system manifestations and in 3 of these definite thromboses were found at autopsy.

The urologist may be confronted by haematuria due to necrosis of kidney tissue from obstruction of renal vessels, or by painful priapism due to thrombosis of vessels within the penis. Pain in a bone with localized tenderness may lead to a diagnosis of osteomyelitis, and aseptic necrosis with collapse of the femoral head has been observed; the bones most likely to show changes are those of the skull, vertebrae, femur, tibia and fibula. The skull may show increased thickness and osteoporosis, and the vertebrae flattening, biconcavity and collapse. The long bones of the hands and feet may show osteosclerosis or patchy osteoporosis. Cases illustrating these conditions are quoted, with reproductions of skiagrams. Leg ulcers characterized by chronicity and resistance to treatment were noted in 42 patients; they were more common in adults than in children and were usually situated on the ankle or lower shin.

In the discussion which followed the reading of this paper emphasis was laid on the fact that the disease is commonest in Negroes under 20 years of age and that cerebral thrombosis or subarachnoid haemorrhage may occur simultaneously with lesions in the abdomen or elsewhere. *W. L. Harnett*

EPIDEMIC DROPSY

CHAKRAVARTY, N. K. & CHAUDHURI, R. N. **Production of Epidemic Dropsy in Monkeys.** *Indian Med. Gaz.* 1951, Sept., v. 86, No. 9, 392-5, 18 figs. on 5 pls.

The authors have succeeded in overcoming the opponents of the argemone oil aetiology of epidemic dropsy whose strong point was the failure to produce the disease in laboratory animals. They have reproduced the disease in two monkeys: in one, by giving the oil in food (rice); in the other by intramuscular injection of the oil sterilized by heating in a waterbath.

To the first monkey, after 3 weeks on a rice diet, there was given also 3 ml. of the oil daily for 22 feeds (4th to 7th weeks), followed by 6 ml. daily for 22 feeds. Oedema appeared in the 10th week and diarrhoea in the 11th. Death occurred in the 12th. The oedema was confirmed by the thiocyanate space estimation which was 435 ml. per kilogramme body-weight, the normal varying between 240 and 333, with an average of 275.25 ml. per kgm. The animal had received altogether 49.5 ml. of the argemone oil.

The second monkey received 6 injections (6 ml.) in the first month and the same in the second, at the end of which oedema appeared in limbs and perineum and erythema of limbs and face. The thiocyanate space was 370 ml. (*i.e.*, higher than the normal maximum) and 3 weeks later had risen to 437 ml. In the 3rd month 5 injections were given; oedema and erythema were more marked; in the 4th month 2 injections (2 ml.) had been given when death occurred. The injections had to be divided in two or three sites because of the local irritation produced. The intervals between injections were usually 3 to 5 days. Oedema was first observed in the 2nd month, after 12 injections had been given.

A third monkey on whose shaved abdomen 25 applications (25 ml.) of the oil were made in a month died at the end of the 4th week without showing any oedema. Photographs of the animals indicate the oedema and photomicrographs demonstrate very clearly the pathological histology of the tissues which is that found in human cases of epidemic dropsy. Other points which came out in this investigation were that rice diet alone, in a control monkey, did not result in oedema and, secondly, that argemone oil may be absorbed from an intact skin and produce its toxic effects in the internal organs. The common practice of inunction with mustard oil may, therefore, if it is adulterated with argemone oil, lead to disaster.

H. Harold Scott

VENOMS AND ANTIVENENES

MOHAMMED, A. H. **Toxins of the Egyptian Cobra** (*Naja tripudians*). [Correspondence.] *Nature*. 1952, Feb. 9, 244-5.

This note records observations on the absorption spectra of the natural venom and the crystallized toxin of the Egyptian cobra.

Details are shown in a table and results are described of the action on the toxin in solution of various agents, including 0.1 *N* hydrochloric acid, 0.1 *N* sodium hydroxide, distilled water, different concentrations of formalin and 5 per cent. acetaldehyde.

From these studies, the author concludes that "it appears from the parallelism in the changes in toxicity with the changes in the absorption band produced by various treatments that this absorption band is related to the toxin".

H. J. O'D. Burke-Gaffney

CILLI, V. Rassegna delle attività svolte dall'Istituto Vaccinogeno Zooprofilattico di Asmara dal 1936 al 1947. Studi e ricerche di patologia tropicale veterinaria. [Report of the Asmara Institute for Animal Vaccines for the Years 1936-1947] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1951, July, v. 32, No. 7, 623-734. [Refs. in footnotes.]

A section of this report deals with venoms and antivenenes (pp. 666-688). In 1942 the Institute undertook the production of antivenene. Five poisonous snakes have been identified in Eritrea, namely, *Naia haie*, *N. nigricollis*, *Bitis arietans*, *Atactraspis microlepidota* and *Echis carinatus*; the last is responsible for nearly all cases of snake-bite and production has been limited to the antivenene against this viper. The venom has been studied for its toxicity to rabbits, guineapigs and white mice and its action on the blood. The report describes the production of the antivenene by treating horses first with anavenene and then with unmodified venom, bleeding them to obtain the immune serum. A total of 102,810 cc. of the serum has been issued from 1943 to 1947: 176 persons were given prophylactic treatment for snake bite in 1945 and 1946 with only one failure; this case, which proved fatal, came up for treatment 3 days after the patient had been bitten when severe necrosis had already set in.

Among several species of scorpion known in Eritrea are some belonging to the genera *Buthus*, *Parabuthus* and *Pandinus* which are larger specimens injecting a higher dose of venom with their sting. The biological properties of the venom of *Parabuthus abyssinicus* and *Pandinus magretti* have been studied at the Institute for their action on white mice, rats and guineapigs.

The changes found in the various organs and systems of the poisoned animals, and the coagulating, haemolytic and proteolytic action of the venom, are briefly discussed. The preparation of the venom from those abdominal segments which contain the poison glands is described. In the production of the immune serum, 3 local donkeys, as had been found suitable for this by SERGENT in Algiers, were first tried but the attempt had to be given up as the serum failed to protect small laboratory animals, when these were used for titration against the venom. The antivenene has, however, been successfully produced in the horse, the same animal having already been subjected to 8 successive inoculation courses and bleedings when this report was being written. A total of 26,350 cc. of anti-scorpion serum was produced, and 6,720 cc. issued, between 1944 and 1947.

J. Cauchi

TAYLOR, E. H. **A Brief Review of the Snakes of Costa Rica.** *Univ. Kansas Sci. Bull.* 1951, Oct. 1, v. 34, Pt. 1, 3-188, 6 maps, 23 pls. & 7 figs. [45 refs.]

DERMATOLOGY AND FUNGUS DISEASES

LIPPARONI, E. Dermatiti da zecche e dermatiti da sostanze vegetali note ed osservazioni circa taluni casi riscontrati in Somalia. [**Dermatitis due to (a) Ticks, (b) Vegetable Substances in Somalia**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1951, Sept., v. 32, No. 9, 913-22. English summary (6 lines).

(a) One night in March, 8 European hunters had to sleep in a part of the Somali bush known as "Dafet", on a bed of grass and dry leaves in a sandy clearing. The area is known to be frequented by gazelles, camels and some other animals. The hunters suffered from general itching during the night and some reported the finding of very tiny ticks on their bodies in the next few days. The itching continued and there was a general papular eruption, together with fleeting patches of erythema near the papules. Each papule was the size of a lentil, raised, with an almost umbilicated centre over which was a dark scab—almost a tiny *tâche noire*. The ticks, which are thought to have been responsible, have not been identified and they may have been in the larval or nymph stage.

(b) Since the end of the last war, shortage of imported wood for making crates in which to export bananas has led to the use for this purpose of the wood from locally cut *Euphorbia candelabrum*. The latex from the bark of this tree has been found to produce skin lesions on the exposed parts of the native wood cutters. There is first an oedematous condition accompanied by the formation of blebs with discharges which dry into crusts. This is followed by a heavy pigmentation, which is thought to be protective to the affected parts; the "ebony black" skin becomes changed into a "pitch black mask" and the occupational nature of the condition can be identified at a glance. This pigmentation wears off in about 3 months after exposure has ceased, but the condition develops afresh if the work is resumed. So long as the skin retains this special pigmentation it remains immune to the latex from the euphorbia bark. As a precaution against this occupational condition the wood cutters smear camels' milk (which is rich in fatty substance) on the exposed skin and sometimes burn off the bark before undertaking tree cutting. The carpenters who make crates out of this euphorbia wood do not come in contact with the bark and do not suffer from the conditions described above.

J. Cauchi

REIN, C., KITCHEN, D., MARQUEZ, F. & VARELA, G. Resultados después de dos años del tratamiento del "Mal del Pinto" con penicilina. [Results of Treatment of *Mal del pinto* with Penicillin] *Medicina*. Mexico. 1951, Dec. 10, v. 31, No. 641, 488-9.

[This is a careful study of more than a little interest.] The authors treated with penicillin G, 300,000 units per cc., 665 patients suffering from pinta and followed a considerable proportion of them at intervals of 1 to 3 months for 2 years, noting the clinical and serological results. Four schemes of treatment were adopted: 1. A single injection of 4 cc. (a total of 1,200,000 units) was given to 392 patients and 214 were re-examined up to 2 years after. 2. One cc. daily (300,000 units) for 4 days; only 11 patients were treated thus and 6 came up for re-examination later. 3. An injection of 4 cc. each week for 4 weeks (a total of 4,800,000 units); 29 were so treated and 12 were followed up. 4. An injection of 1 cc. each week for 4 weeks; 233 were thus treated and 118 were re-examined at the end of 2 years. It will be seen that, except in scheme 3, the total dosage was the same—1,200,000 units—and that of the 665 only a little over half (350) could be re-examined. There was no little difficulty in seeing so many as this, for when the clinical symptoms cleared patients often could not be induced to return for inspection and much effort was expended in tracking them down.

By the first and fourth schemes, 73.82 and 72.89 per cent. [all results are expressed in percentages only] gave satisfactory serological findings after two years, but it was particularly noteworthy that both the serological and the clinical responses were much slower than in syphilis or yaws, but the final results were "much better than those formerly obtained from treatment by the heavy metals". In yaws, as is known, the primary and secondary lesions dry up in 4 days or so and crusts can be easily removed revealing an underlying skin in a good state of repair and cure is usually complete in 3 months; in *mal del pinto* 5-6 months elapse before the pintids disappear. Hyperchromic lesions may take 6 to 12 months. Leucodermic areas, if of recent development, become pigmented, except those over bony prominences. If of long duration, there is no re-pigmentation, but "68.9% of patients with pintids are completely cured and 31.1% greatly improved and only 9.9% of those with dyschromia fail to show appreciable improvement". [Since the first two figures make 100 per cent., it is a matter for conjecture where the 9.9 per cent. come in.] Scheme 1 (a single injection of 1,200,000 units) gave better results than scheme 4 (four injections each of 1 cc. at weekly intervals). The numbers treated by schemes 2 and 3 were too small to furnish results of any statistical value.

[In their conclusions the authors' figures do not altogether agree with the details as given above. Thus, they state that at the end of the 2 years 20 per cent. of the serological reactions were negative, 55 per cent. were definitely improved, while 25 per cent. showed no change in the reaction.] They end by saying that penicillin G with procaine in oil and aluminium monostearate is [at present] the drug of choice for the treatment of *mal del pinto* and they recommend a minimum dose of 1,200,000 units.

H. Harold Scott

SCHWARZ, J. & BAUM, G. L. **Blastomycosis.** *Amer. J. Clin. Path.* 1951, Nov., v. 21, No. 11, 999-1029, 20 figs. [84 refs.]

This important report on North American blastomycosis, which deals chiefly with the pathology of the disease and may be considered as supplementary to the outstanding account of the disease by MARTIN and SMITH (*Amer. Rev. Tuberculosis*, 1939, v. 39, 275, 488), is based on a study of 22 cases which

occurred in Cincinnati over a period of 8 years, and 36 cases represented by specimens and records at the Armed Forces Institute of Pathology, Washington.

A survey of 154 cases reported in the literature showed that the disease occurred in all decennial age periods from birth to the age of 90. It was found most frequently between the ages of 20 and 40 and its distribution according to sex and race showed males 143 and females 11, the white race 109 and coloured races 45.

The source of infection is not known but there is an overwhelming mass of circumstantial evidence pointing to the respiratory system as the chief portal of infection. Despite the very frequent occurrence of skin lesions which constitute the outstanding clinical feature of the disease, the former belief that primary skin infection is common is not borne out by experience ; indeed, the authors could find only three authentic records of primary disease of the skin, and these were due to accidental inoculations at autopsy or in the laboratory.

The infection may spread in the body by lymphatic, lympho-haemic and intracanalicular paths. The lymphatic spread is sometimes shown by the occurrence of mycotic lymphangitis and involvement of the regional lymph nodes. Lympho-haemic spread from a diseased lymph node is analogous to that which occurs in tuberculosis, and is responsible for the rapid dissemination of the lesions. The intracanalicular path is followed by infection in the lungs, kidneys, testes and other tubular organs.

The cytological response to the infection is of two kinds ; an acute, exudative reaction marked by an invasion of polymorphonuclear cells which frequently leads to suppuration, and a more productive reaction in which the reticulo-endothelial system plays the chief part, marked by granulomata or tubercles formed of "epithelioid" cells, multinucleate giant cells mainly of the foreign-body type, small monocytes and plasma cells. These granulomata sometimes showed central necrosis but rarely caseation. There was often a marked disparity between the numbers of fungal cells present and the degree of tissue response; vast numbers of *Blastomyces* might be present with but little cellular reaction, or, on the other hand, large and severe lesions might show few fungal cells.

The pulmonary lesions were of three types : (a) An exudative pneumonia which was often a leucocytic pneumonitis without granuloma-formation ; alveolar destruction was common but major suppuration rare ; focal or more extensive necrosis occurred, but not so great as in tuberculosis. (b) Granulomatous lesions consisting of histiocyte tubercles usually showing numerous giant cells. The parasite was seen less frequently in these than in the exudative lesions. (c) A mixed exudative and granulomatous type. Bronchial lesions were common and frequently caused the destruction of much of the mucosa of the bronchioles and smaller bronchi ; a purulent or mucopurulent exudate, in which the fungal cells could be seen, was usually present. Chronic pleuritis was frequently found.

A tendency to scarring in the lung tissue was often seen and was regarded as evidence of a healing process. Calcification was not a marked feature of the lung lesions, nevertheless, blastomycosis should be considered in connexion with pulmonary nodules of uncertain aetiology, revealed by radiography.

Lesions of the skin conformed to the classical description and the authors considered that they were due to haematogenous spread from a deeper focus of infection. In contrast with the skin lesions arising from primary dermal infection, these lesions did not show any associated mycotic lymphangitis or involvement of the regional lymph nodes.

Lesions of both the exudative and the productive type, sometimes extensive and destructive, were found in other organs ; notably the prostate, testes and adrenals. In two cases, renal tube casts, due to discharge of small abscesses into the tubules, were found to be composed almost entirely of the fungal cells.

The central nervous system was involved in about one-fourth of the cases with disseminated disease. Acute leptomeningitis, sometimes with abundant production of pus, chronic granulomatous or nodular meningitis, ependymitis of the lateral ventricles, blastomycoma, resembling tuberculoma, with partial destruction of the pituitary body, and infiltration of the spinal nerve roots were the more important changes observed. Encephalitis, chiefly of the grey matter, varied in severity from small-cell perivascular cuffing to scattered areas of necrosis or frank abscess.

In view of the frequency of lesions of the spleen, liver and intestine in histoplasmosis and tuberculosis, it is noteworthy that these organs were not often involved in blastomycosis.

The symptomatology, the mycological diagnosis and the treatment of blastomycosis are described. The authors did not find that treatment with potassium iodide and *Blastomyces* vaccine had any influence on the course of the systemic disease, although iodides, like X-ray therapy caused a temporary drying-up of the skin lesions; in fact, no form of chemotherapy was found effective. Surgical extirpation of localized disease offered some hope of cure in selected cases.

J. T. Duncan

YEW, C. C. **Chromoblastomycosis. Preliminary Report of a Case observed in China.** *Chinese Med. J.* Peking. 1951, Nov.-Dec., v. 69, Nos. 11/12, 476-80, 5 figs. on 2 pls.

JENKINS, V. E. & POSTLEWAITE, J. C. **Coccidioidal Meningitis: Report of Four Cases with Necropsy Findings in Three Cases.** *Ann. Intern. Med.* 1951, Nov., v. 35, No. 5, 1068-84, 6 figs. [36 refs.]

According to FORBUS and BESTEBREURTJE [this *Bulletin*, 1948, v. 45, 269] evidence of meningitis has been found at autopsy in about 25 per cent. of the cases of disseminated coccidioidomycosis examined. In the present report, detailed clinical and pathological descriptions are given of four cases of the disease with meningitis.

The first case, in a white male patient aged 36, presented some points of special interest. Three years before the onset of signs of meningitis, the patient had suffered from primary coccidioidomycosis with pulmonary cavitation which, apparently, had been completely cured. The long interval between the primary and the disseminated (meningeal) stages of the disease is consonant with the view of FORBUS *et al.* (above) that the stage of dissemination, as in reinfection tuberculosis, may be markedly delayed, but it is contrary to the observations of SMITH *et al.* [this *Bulletin*, 1949, v. 46, 495] that when dissemination occurs it is usually early and continuous with the primary disease, and, furthermore, that it is unknown, or at least unusual, in cases with pulmonary cavitation. The clinical signs of meningitis in this case were confirmed by the results of examination of the spinal fluid and, although the causative fungus was not found, the marked complement-fixation reaction given by *Coccidioides* antigen with both blood serum and spinal fluid established the diagnosis of coccidioidomycosis and indicated progressive disease. Treatment with penicillin and occasional lumbar puncture was followed by symptomatic improvement, but the symptoms returned and, despite further treatment with streptomycin and potassium iodide, the patient's condition deteriorated and, in addition to severe frontal headache with nausea and vomiting, convulsive seizures occurred and ocular palsies, spastic paresis of the limbs, exaggerated deep reflexes and loss of control of bladder and rectum were present. At this grave stage, treatment with actidione, an antibiotic from *Streptomyces griseus* which is active against fungi, was introduced. The dosage was 30 mgm. actidione in 1,000 ml. of 5 per cent.

glucose solution, intravenously, each day; a total of 300 mgm. of actidione was given. One month after the completion of this course of treatment, a dramatic clinical improvement set in, and six months later the patient could walk, he was mentally clear, had regained some of his lost weight, and control of bladder and rectum was restored, but the spinal fluid still showed pleocytosis, increased protein and reduced sugar content. Three years after the onset of signs of meningitis the patient was known to be alive. Such a degree of recovery from coccidioidal meningitis is unique and the authors hesitate to accept it as conclusive evidence of cure but rather of clinical remission.

In two of the three remaining cases the diagnosis of coccidioidal meningitis was confirmed at autopsy. In the first of these there was marked thickening in the pia-arachnoid on the base of the brain, with numerous granulomata in which *C. immitis* was found, and ependymitis was marked in the fourth ventricle, the floor of which presented a granular appearance. The cause of death was internal hydrocephalus. It is noteworthy that this case failed to respond to two courses of actidione treatment and this is attributed to failure of the drug to cross the tissue barrier of the central nervous system. In the other case, recent lesions on the meninges, related to general miliary dissemination, were superadded to older lesions. The leptomeninges were slightly opaque but there was no general exudate. Some of the miliary granulomata showed an acute, exudative type, and others a more chronic type of inflammatory reaction in which *C. immitis* could be seen. Both types were conspicuous in the brain and in other tissues.

The fourth case was of interest chiefly because the possibility of coccidioidomycosis was not considered during life and therefore no mycological or serological examination for this disease was made. The clinical picture prompted the diagnosis of tuberculous meningitis although *Myco. tuberculosis* was not found. The true nature of the disease was only revealed by the study of brain sections made at autopsy. The disease appeared to be entirely intracranial, there was thickening and opacity of the leptomeninges over the cerebellum and medulla with only a slight amount of exudate. Microscopically, chronic granulomatous lesions were seen and these were restricted to the meninges. In some of these granulomata the spherules of *C. immitis* were found.

J. T. Duncan

TROPICAL OPHTHALMOLOGY

PAGES. [Rapporteur.] L'Ophthalmologie au Maroc en 1950. [Ophthalmology in Morocco in 1950] *Rev. Internat. du Trachome.* 1950, v. 27, No. 2, 91-6.

TOULANT, P., LARMANDE, A. & TOULANT, M. Les conjonctivites purulentes endémo-épidémiques des pays chauds. [Endemo-Epidemic Purulent Conjunctivitis in Warm Climates] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 549-53.

In most tropical and sub-tropical countries epidemics of purulent conjunctivitis are frequent, especially during the summer and autumn. In French North Africa the authors report that epidemics are seen every year and sporadic cases are numerous. The disease is responsible for many cases of blindness. By many writers the gonococcus is considered to be the sole cause of purulent ophthalmia, but in North Africa the Koch-Weeks bacillus is very often a cause. Only very rarely is it due to other organisms such as the streptococcus or pneumococcus. Virus conjunctivitis, with the exception of infantile inclusion blenorrhoea, and infections due to the diplobacillus of Morax-Axenfeld, are never purulent. The authors point out the importance in diagnosis of the causative germ as a

guide to appropriate treatment, for penicillin instillations have no action on the K.W. bacillus, which is best treated by instillations of 1 per cent. streptomycin. Sulphate of zinc is active only against Morax-Axenfeld infections.

E. O'G. Kirwan

CHANG, C. E. & CHANG, H. L. **Epidemic Kerato-Conjunctivitis in Peking.** *Chinese Med. J. Peking.* 1951, Nov.-Dec., v. 69, Nos. 11/12, 488-94. [37 refs.]

An epidemic of 101 cases of epidemic kerato-conjunctivitis, which occurred in Peking from May 1950 to June 1951, is reported by the authors. More males were affected than females. The age-group of the third decade had the highest incidence.

In the majority of cases both eyes were involved and the disease was associated with pre-auricular adenopathy. Superficial punctate keratitis developed in 72.2 per cent. of cases and occurred from 5 to 10 days after the onset of conjunctivitis. Conjunctival scrapings showed predominance of mononuclears but no inclusion bodies were found. Except for the favourable effect of convalescent blood no treatment exerted any influence on the cause of the disease.

In August 1951 another wave of the disease took place in Peking and most of the patients gave a history of visits to the swimming pool.

E. O'G. Kirwan

SADOUGHI, G. La conjonctivite trachomateuse en Iran. [**Trachomatous Conjunctivitis in Iran**] *Rev. Internat. du Trachome.* 1950, v. 27, No. 2, 88-90.

The English summary appended to the paper is as follows :—

"This disease decimates the country excepting one part of the North. In the South-Western area, 40% of the population are affected and hardly treated only at the 3rd and 4th stage. The Farabi Hospital of Teheran is fortunately fitted with a service of 200 beds (Prof. Chams) where electro-coagulation is particularly applied on a wide scale."

BIÉRENT, P. Le traitement du trachome par les diamidines aromatiques. [**The Treatment of Trachoma by Aromatic Diamidines**] *Rev. Internat. du Trachome.* 1951, v. 28, No. 3, 324-37. [42 refs.]

The author gives an account of his studies on the treatment of trachoma. He got excellent results with solufontamide and stibiotherapy. With the aromatic diamidines he also got good results and advocates this therapy in the most refractory cases of old trachoma with excessive secretion. He used lomidine, or 2512, by intramuscular injection in doses of $\frac{1}{2}$ to $1\frac{1}{2}$ cc. daily for 12 days. He considers that the biochemical properties of lomidine would warrant its use in the prophylactic treatment of trachoma.

E. O'G. Kirwan

COSGROVE, K. W. **The Control of Trachoma.** *Southern Med. J.* 1952, Feb., v. 45, No. 2, 152-3.

The author, from Arkansas, gives a short description of the main clinical features of trachoma and refers to the importance of correct diagnosis and treatment, case-finding and follow-up.

He then outlines briefly the treatment of trachoma with sulphanilamide as employed in his practice. He states that "aureomycin and terramycin

apparently relieve the symptoms but in our cases and Siniscal's [personal communication] do not arrest the disease as several recurrences have been seen".

In 1941, the author found 2,611 new cases and these figures have dropped to 70 in 1950 and to 20 up to September, 1951. In the last 12 years, he has treated 7,674 new cases: of these, 7,118 are still arrested. Of 806 cases with entropions, 537 have had surgical treatment.

There were 38 patients in whom the disease was arrested for several years, but who were apparently reinfected and did not develop recurrences: most have been re-arrested with further treatment.

The author wonders how many cases of undiagnosed trachoma have been cured "inadvertently" during the treatment of the many other common conditions for which sulphonamides are now given.

H. J. O'D. Burke-Gaffney

LYONS, F. M. **The Criteria of Cure in Therapeutic Research on Trachoma. The Effect of (a) Sulphanilamide (b) Aureomycin on the Infectivity of Trachomatous Subjects.** *Rev. Internat. du Trachome.* 1950, v. 27, No. 3, 126-35. [14 refs.]

At present a controversy exists between those who consider that certain of the sulphonamides have a specific action on the virus of trachoma and those who consider that improvement results only from control of secondary infection. In America the present-day opinion is that the sulphonamides act primarily on the virus, whereas the majority of workers in Egypt and the Middle East find little evidence to support this view.

The author treated three children suffering from trachoma whose initial infectivity was proved by inoculation of monkeys. Each child was treated for 10 consecutive days with combined local and systemic sulphanilamide. Two out of the 3 trachomatous children were still infective 4 days after completion of a course of sulphanilamide. The incubation period, however, was apparently lengthened. The case of the third child was inconclusive. The author also treated in the same way 3 monkeys in which experimental trachoma was induced and found that 2 of them were still infective 15 days after completion of treatment and the incubation period was normal. Six months after treatment there was no clinical evidence of resolution of the follicles in any of the children or monkeys.

Using aureomycin hydrochloride in 13 cases of active trachoma he found that there was immediate clinical improvement in 10 cases complicated by secondary infection. One severe case in which no bacterial infection was demonstrable, showed rapid and complete regression of the pannus infiltration and within a matter of weeks the follicles disappeared and were replaced by fine scarring. Two cases of early mild uncomplicated trachoma showed no immediate change as a result of treatment but 3 months later there was definite evidence of resolution of the follicles and onset of scarring.

In 2 trachomatous baboons the follicles had disappeared 5 weeks after treatment with aureomycin.

The author concludes that sulphanilamide did not eliminate the infective agent from the conjunctiva, nor did the follicles disappear. By comparison the results obtained with aureomycin, although not wholly conclusive, are promising but the effect on Egyptian trachoma is far short of the results which are claimed in other countries.

E. O'G. Kirwan

PHAM VAN TIEN. Essai de thérapeutique de l'auréomycine sur le trachome. [Trials of Aureomycin in the Treatment of Trachoma] *Rev. Internat. du Trachome*. 1951, v. 28, No. 2, 202-15, 11 figs.

The author in Indochina carried out treatment of trachoma with aureomycin on 50 patients of all ages and in all stages. The drug was used in the form of drops $\frac{1}{2}$ to 1 per cent. (aureomycin hydrochloride 25 mgm. with sodium chloride 62.5 mgm. and sodium borate 25 mgm.) [amount of diluent not stated] or ointment (aureomycin hydrochloride 1 mgm. per gm.) or by the mouth in the form of capsules (aureomycin hydrochloride 250 mgm.).

He points out that aureomycin is well tolerated when given by the mouth and when used locally is more efficient in the form of drops than as an ointment. No special benefit has been observed when the drug is used in association with penicillin. Although it is valuable in the treatment of trachoma he considers that it has no specific action on the virus of trachoma but only on the secondary infections. Trachoma follicles remain unaffected. Conjunctival scraping repeated every two days is useful and allows a better penetration of aureomycin in the conjunctiva when the drug is applied to the raw surface in the form of an ointment.

Full clinical details, with illustrations, are given of 8 selected cases.

E. O'G. Kirwan

MOUTINHO, H., GRILLO, E. M. & DE MOURA, S. Premiers essais de traitement du trachome avec l'auréomycine. [Preliminary Trials of Aureomycin in the Treatment of Trachoma] *Rev. Internat. du Trachome*. 1949, v. 26, No. 3, 223-5.

The English summary appended to the paper is as follows :—

"The antibiotic aureomycin extracted by Duggar from streptomycetes aureofaciens acts above all in lymphogranulomatosis. Its application to Trachoma in the shape of ointment ; maintaining the stability of the product was studied in Lisbon by the authors who report 14 favourable cases remarkable by the rapid results obtained."

SAKON, H., KOHN, Maria & RAPHAEL, E. R. Réflexions sur les résultats obtenus avec l'auréomycine et la chloromycétine dans le traitement du trachome. [On the Treatment of Trachoma by Aureomycin and Chloramphenicol] *Rev. Internat. du Trachome*. 1951, v. 28, No. 3, 309-24. [21 refs.]

The authors set out to discuss a simple and efficacious method for the mass treatment of trachoma in Morocco.

They used aureomycin drops and ointment in 2.5 per cent. and chloramphenicol in 5 per cent. concentrations. Each case was treated for 46 days. They found in all cases that the inflammation of the conjunctiva rapidly disappeared and early follicles were replaced by fine scar tissue. The larger florid follicles were transformed into papillary nodules or degenerated into gelatinous vesicles with accompanying scar formation.

The drugs had no action on the pannus formation.

The advantages of these two antibiotics are that they cut short the period of treatment in the various stages, are well tolerated and cause no pain. But in spite of encouraging results the authors consider that this therapy must be considered as an auxiliary treatment and not a specific one.

E. O'G. Kirwan

BAILLIART, P. Réflexions sur la lutte contre le trachome dans les possessions ou régions d'influence française en Afrique. [**Observations on the Campaign against Trachoma in the French Possessions or Spheres of Influence in Africa**] *Rev. Internat. du Trachome*. 1951, v. 28, No. 2, 196-201.

The author discusses the prevalence and the gravity of trachoma in Algeria, Tunis and Morocco and points out that the disease is extending towards the south and especially to Togo, the Gold Coast, the Ivory Coast and the Cameroons. The infection is spread by the Moors coming from the north and principally by the land routes. He advises a strict control in Madagascar and the erection of an anti-trachomatous centre at Bamako with modern and complete departments for information, treatment and research.

E. O'G. Kirwan

BHADURI, B. N. & AGARWALLA, R. **Terramycin in Ocular Inflammations.** *Calcutta Med. J.* 1951, Nov., v. 48, No. 11, 363-5.

The authors carried out a clinical study with terramycin on the eyes of 152 patients in Calcutta. The drug was administered by local application only in the form of drops or ointment. In inflammatory diseases involving the anterior half of the eye, they found terramycin to be successful in some cases. In acute and chronic catarrhal conjunctivitis and corneal ulceration response to treatment was quick and effective.

E. O'G. Kirwan

HEAT STROKE AND ALLIED CONDITIONS

DOLE, V. P., STALL, B. G. & SCHWARTZ, I. L. **Methods for Local Induction and Quantitative Analysis of Human Sweat.** *Proc. Soc. Exper. Biol. & Med.* 1951, July, v. 77, No. 3, 412-15, 3 figs.

The earlier demonstration that the concentration of sodium in the sweat is affected by the systemic administration of steroid hormones has an immediate bearing on the quantitative study of the composition of sweat. It may be possible to use sweat measurements for the clinical evaluation of patients with suspected disturbance of steroid metabolism. This paper describes observations in which sweat glands were stimulated locally and the sweat was analysed quantitatively. Sweating was induced by the subdermal injection of a cholinergic drug (usually acetyl- β -methylcholine chloride), and the sweat absorbed on pre-weighed discs of filter paper. The amount of sweat collected was usually 0.1 to 0.01 ml. per disc. A plastic chamber covered the discs during collection of the sweat, so as to prevent evaporation.

After weighing of the samples they were extracted for analysis by a method which is described in detail and the analysis for sodium was done with a flame photometer.

Some typical responses to local stimulation are shown graphically. Excretion begins within 5 seconds after injection, rises to a maximum rate within 20 minutes, and thereafter declines exponentially with a half time of 10 to 30 minutes.

T. Bedford

BERENSON, G. S. & BURCH, G. E. **Studies of Diffusion of Water through Dead Human Skin : the Effect of Different Environmental States and of Chemical Alterations of the Epidermis.** *Amer. J. Trop. Med.* 1951, Nov., v. 31, No. 6, 842-53, 6 figs. [13 refs.]

The rate of diffusion of water through dead human skin in contact with a reservoir of saline was found to vary directly and almost linearly with the

temperature and water-vapour pressure of the surrounding atmosphere ; it fell with increasing environmental relative humidity until, in saturated air, water was gained by the skin.

Epidermis which had been separated by autolysis and by blistering by cantharides and second-degree burns showed practically the same water loss as intact skin (1/40th as much as the dermis alone), indicating that the superficial layer was the barrier to outward diffusion of water vapour.

Radiant heat applied locally to the skin by infra-red lamp had the same influence on water loss as natural air of the same temperature. White and dark Negro skins behaved similarly in these conditions. Erythema doses of ultra-violet light did not alter the rate of diffusion.

A thin film of stopcock lubricant caused a decrease of 75 per cent., and fanning with hot air an increase of 30 per cent. in water loss.

Various chemical treatments of the skin indicated that lipid substances in the epidermis were the main inhibitors of water loss and that keratin probably acts as a framework for these lipids.

[The finding (Fig. 2) of linear increase in water loss with vapour pressure of the atmosphere is unexpected, and contrary to the conclusions of WHITEHOUSE, HANCOCK and HALDANE (*Proc. Roy. Soc.*, 1932, Ser. B., v. 111, 412). The true effect must have been swamped by changes in temperature of the air or skin.]

M. L. Thomson

TROPICAL ULCER

O'BRIEN, H. D. **Treatment of Tropical Ulcers.** *Brit. Med. J.* 1951, Dec. 29, 1544-51. [34 refs.]

Tropical ulcers formed 13.6 per cent. of the cases treated as out-patients at a hospital in Tanganyika situated at an altitude of 1,000 feet above sea level, and 4 per cent. of those in another hospital which was 4,000 feet above sea level. This paper deals with a comparison of methods of treatment used in 368 cases. The overall stay in hospital of these patients averaged 26.5 days, with 7 days' relief from duty after discharge. Many of the patients had been under-nourished for years and had not been long enough in the employ of the Overseas Food Corporation to benefit from the better food provided. Most of the ulcers were on the legs ; 181 of 209 gave a history of injury, in the remainder reliable histories were not obtainable. Infection is generally mixed, but in most acute and subacute cases there is a preponderance of Vincent's organisms ; in the present series these were found in 126 of the 144 cases in which the exudate was examined microscopically. That the mouth is probably a reservoir of infection is shown by the fact that in 37 of 41 patients the same organisms were found in both mouth and ulcer. The Kahn reaction was positive in 38 of 95 patients who came from the Southern Province where yaws is common. Of 135 consecutive patients, 59 had regional lymphadenopathy, 34 had some fever on admission (excluding cases with positive blood slides for malaria), 25 had involvement of tendons, bones or muscles.

As general treatment 100 mgm. of ascorbic acid were given daily to all patients and crude cod-liver oil or vitaminized shark oil in doses of 7 ml. daily with absolute rest in bed, as far as possible. Procaine penicillin 150,000 units was given twice daily for 2 to 4 days, followed by two doses of 150,000 before grafting, followed by two doses after grafting ; for those with bone involvement rather larger doses were employed.

To arrest infection before grafting various methods were tried and the conclusion was reached that the Winnett Orr treatment was the most economical

in dressings and time and was less painful than the use of antiseptic dressings. Preliminary cleansing of the ulcer with C.T.A.B., eusol and H_2O_2 was followed by dusting with penicillin and sulphathiazole powder and application of a light plaster cast. After 7 days' rest in bed the ulcer was grafted with Thiersch grafts and again enclosed in plaster of paris. In cases where bone was exposed, pedicle or cross-leg flap grafts were used. Local anaesthesia was employed for cutting the grafts in preference to general anaesthesia. The plaster cast was left undisturbed for 8 days, after which it was removed and the patient discharged wearing an Unna paste bandage. Amputation was necessary in 3 cases of terminal digit ulceration and in one patient with a pathological fracture of both bones of the leg, who subsequently died from bacillary dysentery. In 60 per cent. the result of the grafting was good (90 per cent. cover), and in 36 per cent. fair (50-80 per cent. cover). Patients could usually be returned to duty 14 days after grafting, the average stay in hospital being 24.7 days, irrespective of the site of the ulcer, but large ulcers and those of long duration required a slightly longer stay. Seven primary treatment schedules are described and results are shown in 16 tables.

W. L. Harnett

O'BRIEN, H. D. **Treatment of Tropical Ulcers.** *East African Med. J.* 1951, Nov., v. 28, No. 11, 453-61.

This is a shorter version of the above paper.

MISCELLANEOUS DISEASES

JAFFÉ, L. Zur Hals-Nasen-Ohrenheilkunde der warmen Länder. I. Mitteilung. [**Ear, Nose and Throat Diseases of Warm Climates**] Reprinted from *Ztschr. f. Laryngol. Rhinol. Otol.* 1951, July-Aug., v. 30, Nos. 7/8, 295-301.

——. Oto-rhino-laryngologische Symptome und Komplikationen von Tropenkrankheiten. II. Mitteilung. [**Ear, Nose and Throat Symptoms and Complications of Tropical Diseases**] Reprinted from *Ztschr. f. Laryngol. Rhinol. Otol.* 1951, Sept., v. 30, No. 9, 404-12. [63 refs.]

These papers together constitute a review of the literature and discussion of ear, nose and throat [E.N.T.] conditions and complications in relation to tropical medicine. The author writes from Almirante, Panama, and has himself made considerable contributions to this subject.

He takes the reader through a wide range of diseases, firstly the cosmopolitan ear, nose and throat conditions as seen in the tropics, secondly those conditions primarily of tropical incidence and finally the E.N.T. complications of tropical diseases in general.

The first paper, after an account of the common E.N.T. diseases in the tropical background, discusses tropical external otitis, tropical vasomotor rhinitis, myiasis, leeches and *Rhinosporidium* infections. The second paper deals with the E.N.T. aspects of malaria, yaws, goundu, bejel, relapsing fever, leishmaniasis, blastomycosis, scrub typhus, onyala, beriberi and pellagra.

The geographical distribution is given in most cases, with a short account of the aetiological, pathological, clinical and therapeutic aspects. Cases in the literature are quoted extensively, and much of that literature has already been noted in this *Bulletin*. There are 63 references.

The author has performed a valuable service in bringing together this accumulated knowledge of E.N.T. conditions in the tropics.

H. J. O'D. Burke-Gaffney

VAN OYE, E. & CHARLES, P. Contribution à l'étude de la fonction hépatique chez le noir africain. I. Le diamètre érythrocytique moyen. [**Contribution to the Study of Liver Function in Africans. I. Mean Erythrocytic Diameter**] *Ann. Soc. Belge de Méd. Trop.* 1951, June 30, v. 31, No. 3, 387-402, 3 figs. [23 refs.]

The macrocytosis that has been observed in Africans has been variously attributed to a racial factor, anaemia, hepatic dysfunction and parasitism.

The authors first carried out studies in "normal" Africans from several regions in tropical Africa. These studies included red cell counts, haemoglobin estimation, examination for blood parasites, serum bilirubin estimation, the thymol turbidity test, the Takata-Ara test and the distilled water test (VINCENT and GIRARD, *Presse Méd.*, 1949, v. 57, 807)—estimation of serum protein fractions, and the measurement of the mean corpuscular diameter (MCD) and construction of Price-Jones curves.

It was found that the MCD of the African was the same as that of white persons of comparable age, but that in later years the African showed a tendency to develop a macrocytosis. In the new-born the average size was 8.608μ with extremes of 6.0μ and 11.0μ . The size is reduced gradually until the age of 12 to 13 years when it is 7.1μ to 7.4μ without any macrocytic tendency. Subsequently this tendency develops and the MCD increases in many cases with the age of the patient.

The MCD was correlated with the red cell count and it was concluded that the increase in the MCD was not a result of anaemia.

Serum protein estimation and fractionation showed a decrease in total protein in all groups, mainly attributable to deficiency in albumin, in adults an increase in the globulin especially the γ -globulin fraction and an inversion of the albumin/globulin ratio. The latter changes develop gradually and run parallel to the increase in the MCD. Since these serum-protein changes are evidence of liver dysfunction, the authors conclude that the macrocytosis that was found in many adults was due to liver dysfunction.

Further, it was shown that there was evidence of liver dysfunction in 60.5 per cent. of 152 African women, whereas in 101 African medical assistants and 52 soldiers the percentages of dysfunction were only 42.5 and 37.5 respectively.

The authors conclude that malnutrition is an important cause of liver dysfunction but that multiple parasitism is also important; this is suggested by the high γ -globulin. As to the mechanism of the production of the macrocytosis, they suggest that there is probably a liver fraction that controls the MCD, as suggested by FOY, KONDI, HARGREAVES and LOWRY [this *Bulletin*, 1951, v. 48, 67], and that this fraction is affected by liver disease.

L. E. Napier

VAN OYE, E. & CHARLES, P. Contribution à l'étude de la fonction hépatique chez le noir africain. II. Influence de la grossesse. [**Contribution to the Study of Liver Function in the African. II. The Influence of Pregnancy**] *Ann. Soc. Belge de Méd. Trop.* 1951, June 30, v. 31, No. 3, 403-8.

A study was undertaken of the liver function in 100 non-pregnant and 100 pregnant African women. The four tests carried out were serum-bilirubin estimation, the distilled water test of Vincent and Girard, the thymol turbidity test, and the Takata-Ara reaction.

It was found that in 61 of the non-pregnant women at least one of the liver function tests was positive, whereas in the pregnant women 41 were positive. This suggests a favourable effect of pregnancy.

However, the serum proteins were also estimated in these 200 women. It was found that in both groups the total protein was below normal but in the pregnant women it was lower, the albumin was markedly reduced, again more in the pregnant women, the albumin-globulin ratio was very low, and while the γ -globulin was about normal or slightly raised in the non-pregnant women it was considerably lower (on an average by 18 per cent.) in the pregnant women. It is this low γ -globulin and the general hypoproteinaemia which explains the higher percentage of normal liver function tests in the pregnant women; this negatives the suggestion that pregnancy has a favourable influence.

The changes caused by pregnancy in the African are parallel to those in white women. L. E. Napier

JELLIFFE, D. B. & HUMPHREYS, J. **Lesions of the Feet in African Soldiers.** (A Clinical Survey of 464 Nigerian Troops.) *J. Trop. Med. & Hyg.* 1952, Jan., v. 55, No. 1, 1-5, 2 figs. [16 refs.]

The feet of 464 African soldiers stationed at Ibadan, Nigeria, were examined. Moderate changes were found in 196 (31 per cent.) and marked lesions in 31 (6.6 per cent.). The lesions found were described as (a) deep fissuring of the sole, (b) plantar pitting, (c) fissuring of the rim of the heel, (d) erosions of the plantar skin, (e) postero-lateral thickening of the heel. Of the 31 soldiers the serum was Kahn positive in 11 (35 per cent.) but the most severe lesions were in serologically negative men. The authors think that in only two of the 31 men was yaws responsible; in them the serum was Kahn positive and the response to treatment was rapid. They think injury is the most important cause and recommend that light footwear should be worn. Few foot lesions occurred in men on sedentary duties although most of these came from eastern yaws-areas, while the general duties soldiers usually came from yaws-free dry northern areas.

[This paper is interesting and the subject needs more intensive study. It is unfortunate that no reference is made to the most important paper on the palmar and plantar lesions of yaws so far published, BAERMANN (*Arch. f. Schiffs- u. Tropenhyg.* 1911, v. 15, Beiheft 6) in the discussion of the clinical picture of foot yaws.] C. J. Hackett

KITTRELL, Beulah M. **Tick Paralysis. Report of a Case.** *J. Amer. Med. Ass.* 1951, Dec. 15, v. 147, No. 16, 1561-2, 1 map. [Refs. in footnotes.]

A case in a child in Tennessee.

PROTOZOOLOGY: GENERAL

STANKOVIĆ, M. & STANKOVIĆ, I. Premiers cas probables de toxoplasme en Yougoslavie. [First probable Cases of Toxoplasmosis in Yugoslavia] *Srpski Arhiv za Tselokupno Lekarstvo* (*Arch. Serbes de Méd.*). Belgrade, 1951, Jan., v. 49, No. 1 [in Serbian 19-25, 2 figs. French summary 25].

The authors describe what they consider to be the first records of human toxoplasmosis in Yugoslavia. The patients were 3 infants, 17, 14 and 14 months old respectively. In all these cases there were typical toxoplasmic ocular changes in the macular region and on the periphery of the retina. One patient had marked hydrocephalus, while in the two others there was microcephaly. All of them had psychomotor disturbances, amaurosis and other pathological manifestations related to the central nervous system. Calcifications—probably

intracerebral—were noted in one case only. Serological tests could not be carried out owing to the absence of a strain of *Toxoplasma*. The authors believe that toxoplasmosis is common in Yugoslavia but remains undetected. They emphasize the importance of ocular manifestations for the diagnosis of this disease.

C. A. Hoare

RABKIN, J. & JAVETT, S. N. **Congenital Toxoplasmosis. Report of a Case and a Brief Summary of the Literature.** *South African Med. J.* 1952, Jan. 19, v. 26, No. 3, 41-3, 1 fig. [23 refs.]

"1. A case of congenital toxoplasmosis showing four of the major criteria for its diagnosis is reported.

"2. The literature on congenital toxoplasmosis has been summarized briefly.

"3. The clinical, pathological and radiological features of congenital toxoplasmosis are described."

[A case seen in South Africa in a child of 4, born in the Belgian Congo.]

HAVLÍK, O. Experimentální přenos toxoplasmosy klíštětem *Ornithodoros moubata*. [Experimental Transmission of Toxoplasmosis by *Ornithodoros moubata*] *Časopis Lékařů Českých*. Prague. 1951, Dec. 28, v. 90, Nos. 51/52, 1516-18.

The English summary appended to the paper is as follows :—

"The experimental transmission of toxoplasmosis by *Ornithodoros moubata* was studied. Ticks were allowed to feed on infected mice and then crushed and injected into white mice. *Toxoplasma* organisms were shown to survive in ticks at least for 23 days. The tick bite does not appear to transmit the infection. The fluid from coxal glands and excrements of infected ticks proved to be infectious 23 days after blood sucking."

GARNHAM, P. C. C. **A New Piroplasm from the Rock Hyrax.** *J. Parasitology*. 1951, Dec., v. 37, No. 6, 528-32, 25 figs. [14 refs.]

GOODWIN, L. G. **The Chemotherapy of Tropical Diseases. Part I. Protozoal Infections.** *J. Pharmacy & Pharmacol.* London. 1952, Mar., v. 4, No. 3, 153-68. [206 refs.]

A very full review of the literature.

ENTOMOLOGY AND INSECTICIDES : GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

PETERSON, A. **Larvae of Insects. An Introduction to Nearctic Species. Part II. Coleoptera, Diptera, Neuroptera, Siphonaptera, Mecoptera, Trichoptera.** pp. v+416, 104 figs. 1951. Columbus. [56s.]

An account of insect larvae of North America : keys to families ; brief account of larvae of each family, and selected references : good clear figures of many types.

P. A. Buxton

- FROHNE, W. C. **Seasonal Incidence of Mosquitoes in the Upper Cook Inlet, Alaska.** *Mosquito News.* 1951, Dec., v. 11, No. 4, 213-16.
- FROHNE, W. C. & SLEEPER, D. A. **Reconnaissance of Mosquitoes, Punkies, and Blackflies in Southeast Alaska.** *Mosquito News.* 1951, Dec., v. 11, No. 4, 209-13.
- WEST, A. S. & JENKINS, D. W. **Plant Feeding Habits of Northern Mosquitoes studied with Radioisotopes.** *Mosquito News.* 1951, Dec., v. 11, No. 4, 217-19.
- CARPENTER, S. J. **Studies of *Culicoides* in the Panama Canal Zone (Diptera, Heleidae).** *Mosquito News.* 1951, Dec., v. 11, No. 4, 202-8, 5 figs.
- BONNET, D. D. **The Distribution of Mosquito Breeding by Type of Container in Honolulu, T.H.** *Proc. Hawaii. Entom. Soc.* 1947, v. 13, No. 1, 43-9, 4 figs. [18 refs.]

See also p. 502, LUMSDEN, **The Crepuscular Biting Activity of Insects in the Forest Canopy in Bwamba, Uganda. A Study in relation to the Sylvan Epidemiology of Yellow Fever.**

- KIRK, R. & LEWIS, D. J. **The Phlebotominae of the Ethiopian Region.** *Trans. Roy. Entom. Soc. of London.* 1951, Dec. 28, v. 102, Pt. 8, 383-510, 74 figs. [Numerous refs.]

Literature on sandflies of the genus *Phlebotomus* is copious but very scattered. The authors, while working on the *Phlebotomus* of the Anglo-Egyptian Sudan, collected together all published papers on the Ethiopian species and expanded them into this up-to-date monograph. As systematic work on the immature stages of *Phlebotomus* has been negligible, this account is concerned solely with the adults.

The text is divided into 5 parts, the first of which covers the life history, bionomics and distribution of African sandflies, and their relation to disease and control. The second part deals with *Phlebotomus* anatomy, synonymy and classification. Next come the keys for identification, first for the males and females of the subgenera *Phlebotomus*, *Sintonius* and *Sergentomyia* and then for the males and females of the species.

The fourth part is the major portion of the book and occupies nearly 80 pages in which are given the descriptions of over 80 species and varieties of *Phlebotomus* which have been recorded from the Ethiopian region. Some of the descriptions are as published by their original authors and others have been compiled from the originals by the present authors. Important morphological details are illustrated.

[It is noted that, of the species and varieties described, there are still 20 males and 7 females unknown. It is also noted that the description of *Phlebotomus* (*Sergentomyia*) *crossarai* at the bottom of page 479 is of a female and not of a male.]

In an appendix, laboratory and field techniques are described and discussed. These include methods of collecting and mounting sandflies for study and the preparation and dissection of specimens for examination of the terminalia, spermatheca and pharynx. As practically all the examination of *Phlebotomus* is done with the microscope it is essential to get good, clean preparations and this section is an important part of the work.

Methods for rearing sandflies in captivity and for keeping the adults alive are described and a timely warning is given here to laboratory workers that it is always necessary to take careful precautions against contamination of their breeding tubes by DDT.

This publication will undoubtedly be a valuable work of reference for some time to come.

H. S. Leeson

LAVOPIERRE, M. **A further Note on Bonanni's Description, published in 1691, of a Sandfly.** *J. Trop. Med. & Hyg.* 1952, Feb., v. 55, No. 2, 27-30, 4 figs.

JONES, B. R. **Human Myiasis in New Zealand. Ophthalmomyiasis Externa due to *Oestrus ovis* : Report of a Case.** *New Zealand Med. J.* 1951. Suppl. [Trans. Ophthalm. Soc., N.Z.] 55-60, 1 fig.

HARANT, H., HUTTEL, W. & HUTTEL, Nancy. *Parapterobosca anthropophila* nov. gen., n. sp. Cératopogonide de la Côte d'Ivoire vulnérant pour l'homme. [*Parapterobosca anthropophila*, a Ceratopogonid from the Ivory Coast which is Harmful to Man] *Ann. Parasit. Humaine et Comparée.* 1951, v. 26, Nos. 5/6, 468-72, 5 figs.

COLAS-BELCOUR, J. & RAGEAU, J. Tiques de Tunisie. Ixodines. [**Ixodine Ticks of Tunisia**] *Arch. Inst. Pasteur du Maroc.* 1951, v. 4, No. 4, 360-67. [25 refs.]

This is merely a list of 14 species of "hard ticks" (*Ixodinae*) belonging to 6 genera, known to occur in Tunisia. The list gives also the names of their hosts and the localities and dates of collection.

H. S. Leeson

DICKE, R. J. & MORGAN, B. B. **Insecticide Dusts for Control of the Brown Dog Tick.** *J. Econom. Entom.* 1951, Dec., v. 44, No. 6, 991.

"Dogs infested with the brown dog tick, *Rhipicephalus sanguineus* (Latr.), were treated with dusts containing 2 per cent chlordane, 1 per cent gamma isomer of benzene hexachloride, 5 per cent DDT and 5 per cent lime-activated sabadilla. Of these dusts, benzene hexachloride and chlordane appeared to be effective and relatively non-toxic insecticides for use on dogs and in kennels to control brown dog ticks."

KNIPLING, E. F. **Toxicity of certain Oil Emulsions to Mosquito Larvae and Pupae.** *Mosquito News.* 1951, Dec., v. 11, No. 4, 197-201.

The mineral oils used as mosquito larvicides were largely displaced by solutions of DDT, when this insecticide was introduced, because of its greater efficiency at low dosages per acre. However, the reports of DDT-resistance developing among mosquito larvae suggest that research on mineral oil larvicides should not be entirely abandoned. [Oil larvicides have certain advantages: they can kill pupae, which survive DDT; they are rather more persistent in effect; and they scorch vegetation and thus prove that the larvicider has done his job.] This paper shows how certain emulsifiers greatly improve the larvicidal effects of fuel and diesel oils.

Laboratory tests were done in large enamel dishes with collected larvae of *Aedes vexans* and *A. sticticus*. These experiments were followed by semi-field tests in which larvae were confined in 11-inch cylinders in their actual breeding waters, and subjected to the larvicides. As a standard emulsion, 2 parts fuel oil were emulsified with 1 part water, with the use of 2 per cent. coconut oil

soap. This concentrate was diluted further and applied at rates from 5 to 20 gallons/acre. Similar tests were made with the same emulsion containing 0.07 per cent. pyrethrins. The effects of these two standards were compared with emulsions made from commercial oil-soluble emulsifiers added to the oil at 3 per cent. Three of the most promising were "Nopco 1216" (a sulphated sperm oil), "B 1956" (a phthallic glyceryl alkyl resin) and "Amine 230X" (an 18-carbon chain complex amine). These preparations produced emulsions far more larvicidal and pupicidal than the standard emulsions, both in laboratory and field trials. A given quantity of oil emulsified by these materials was twice as effective as the same quantity emulsified with coconut oil soap. The effect on the pupae was even greater, being 6 to 8 times as great as the standard emulsion and 3 times as toxic as the standard plus pyrethrins. In some full-scale field trials, the new formulae were completely effective at 5 gallons of oil per acre.

The author considers that the greater kill by the synthetic emulsifiers was due to the enhanced wetting effect, which spread an oil film over spines and walls of siphon tubes and prevented the larvae remaining at the surface. Most of the larvae thus died of asphyxiation; and death occurred much sooner in oxygen-free water than in normal tap water.

J. R. Busvine

VAN THIEL, P. H. **The Repellent Effect of Insecticides, especially of Contact Insecticides.** *Documenta Neerlandica et Indonesica de Morbis Tropicis*. Amsterdam. 1951, June, v. 3, No. 2, 116-25. [23 refs.]

The author reviews the observations of various workers on effects of DDT residual deposits on mosquitoes and analyses them into stages. He gives a small number of original observations.

BARLOW, F. & HADAWAY, A. B. **Studies on Aqueous Suspensions of Insecticides.**

Part II. Quantitative Determinations of Weights of DDT picked up and retained. *Bull. Entom. Res.* 1952, Jan., v. 42, Pt. 4, 769-77, 2 figs.

The authors describe a modification of the Schechter-Haller method for determining minute quantities of DDT picked up by groups of 20 mosquitoes (*Aedes aegypti*) or individual tsetse flies (*Glossina palpalis*) exposed to residues of aqueous suspensions, usually on plaster blocks. The insects were confined on the treated surfaces under glass funnels, the tsetse flies for 15 seconds and the mosquitoes from $\frac{1}{4}$ to 32 minutes. The DDT adhering to the insects after exposure was found to be related to various factors as follows:—

Type of insect.—Tsetse flies picked up more than mosquitoes. The former exposed to a deposit of 25 mgm./sq. ft. for 15 seconds acquired over 3 μ gm. per insect, compared with 1.0 μ gm. picked up from the same deposit by a mosquito in 30 seconds.

Time of exposure.—The weight of DDT adhering to the mosquitoes was found to increase with the length of exposure, though the rate of increase gradually declined.

Crystal size.—The actual weight of DDT picked up first increased and then declined with a rise in crystal size.

| | | Crystal size (microns) | | | |
|---|-----|------------------------|-------|-------|-------|
| | | 0-10 | 10-20 | 20-40 | 40-60 |
| Pick-up by mosquito in 2 mins. (μ gm.) | ... | 0.13 | 1.0 | 1.7 | 0.25 |
| Pick-up by tsetse in 15 secs. (μ gm.) | ... | 0.4 | 4.0 | 4.6 | 2.6 |

Some experiments were made on the retention of crystals of different sizes, after exposures to deposits giving partial kills. The losses after one hour amounted to 50, 60, 75 and 80 per cent. respectively of the initial pick up of the four grades of crystals used. Losses were assumed to be due to (i) absorption into the insect and (ii) crystals falling off. The latter, which would probably be greater, was held responsible for the poorer retention of the larger crystal grades.

Mortality.—For any given crystal size, the mortality produced was correlated with the weight of DDT per insect. The lethal effect of the smaller crystals was greater than that of larger ones, so that the median lethal doses per mosquito compared as follows:

| | | | |
|----------|---------------|------|----------------|
| Crystals | 0-10 μ , | LD50 | 0.12 μ gm. |
| „ | 10-20 μ , | „ | 0.42 μ gm. |
| „ | 20-40 μ , | „ | 2.13 μ gm. |

In addition to being more efficient, the smaller-size crystals were more rapid in producing signs of intoxication.

Type of surface.—On plaster blocks 0-10 μ DDT crystals are less effective than the 10-20 μ grade, against mosquitoes, for the same short contact periods. The reverse is true, however, for deposits on mud blocks, from which the very finest type of crystal can be more rapidly picked up by mosquitoes.

Suspensions of DDT crystals are highly insecticidal on porous surfaces, because the liquid seeps in, leaving the crystals on the top. With impermeable surfaces such as glass, however, the liquid dries and the wetting agent present sticks the particles tightly to the substrate. Deposits on such surfaces, therefore, have low insecticidal activity and similar effects occur on porous surfaces which are difficult to wet.

J. R. Busvine

ROMEIRO, L., KEMP, H. & BARRAGAT, P. Desenvolvimento técnico de emulsificantes à base de óleos vegetais—segunda comunicação. [Technical Development of Emulsifiers with a Vegetable Oil Base. Second Communication] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1951, Jan. 15, v. 3, No. 1, 7-13, 3 figs. on 2 pls. & 3 diagrams. English summary.

DDT emulsions, containing the emulsifier Triton X-100, had been used widely against mosquitoes in Brazil. This paper reports the discovery of an emulsifier prepared from castor oil and glycerine. Castor oil beans are a natural product of Brazil and can therefore be obtained easily at a comparatively low cost. Moreover, the emulsifier obtained from them (known as B.13) was quite as efficient as other emulsifiers on the market. After successful preliminary tests a plant, consisting of a large iron vat with a helicoidal mixer embedded in a refractory brick oven, was built for extraction of the product. It was found that B.13 could be produced at one-third the cost of the imported Triton X-100 and, further, laboratory experiments proved that emulsions prepared with B.13 were more stable than those prepared with Triton X-100.

C. Mary Harrison

ROSS INSTITUTE INDUSTRIAL ADVISORY COMMITTEE [WIGGLESWORTH, A., Chairman]. LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE. Information and Advisory Service. 1950, Nov., No. 5, 20 pp., 12 figs. **The Housefly and its Control.**

This pamphlet gives some excellent advice on house-fly control, but also contains several misleading statements. An adult female fly, for instance,

need not be 10 days old before laying the first batch of eggs ; under favourable conditions eggs are laid by flies 4 days old.

The necessity for the sanitary disposal of human and animal waste is quite rightly emphasized. The modern method of sewage disposal by water digestion is the only really efficient method of preventing fly breeding. Fly breeding in manure may be reduced by stacking the manure firmly, and covering the surface with a smooth layer of cow dung, sacking impregnated with tar or tarpaulins to prevent flies from egg-laying. In a tightly packed stack any maggots are killed by the high temperatures resulting from fermentation. Maggots migrating from a stack to find a dry place for pupating may be caught in a specially constructed gutter surrounding the stack.

Adult flies may be reduced in numbers, either by the use of a Bruton-type fly trap with an attractive bait, or by the use of insecticides. Residual insecticides such as DDT, BHC or chlordane are particularly useful against the house-fly. A dosage of 7 oz. of DDT per 1,000 sq. ft. of wall surface is recommended and will remain effective for 3 months. Solutions of 5 per cent. DDT in kerosene are readily prepared and can be applied to wall surfaces by means of a knapsack sprayer. DDT emulsions and suspensions have the added advantage that they can be diluted or prepared with water at the site of application. DDT suspensions, however, leave an obvious deposit on the wall surface, and also tend to clog the nozzle of spraying apparatus. BHC, although a useful insecticide, remains effective for approximately 8 weeks only.

In recent years house-flies have been found in many countries to have become resistant to DDT ; moreover, contrary to the suggestion of this pamphlet, they may be resistant to many other insecticides as well. Consequently the use of sanitary measures against flies is of prime importance, and in particular, the prevention of fly-breeding.

Very useful information is given in the appendix on blow flies, the construction of a manure enclosure, and the disposal of waste matter under primitive conditions by a composting process.

C. Mary Harrison

BRUCE, W. N. **Characteristics of Residual Insecticides Toxic to the House Fly.**

Bull. Illinois Nat. Hist. Survey. 1949, July, v. 25, Art. 1, 1-32, 14 figs. & 1 pl. [23 refs.]

This paper describes an investigation of the toxicity to the house-fly, *Musca domestica*, of DDT, DDD, chlordane, gamma BHC, and toxaphene, on various surfaces and under different environmental conditions. The flies were exposed to the insecticide in specially constructed flat cages with a panel which could be replaced by a treated surface. After exposure, flies were removed to holding cages and mortality counts were made 24 hours later.

Tests with suspensions of the insecticides applied to glass showed that DDT and gamma BHC were outstanding in toxicity and the other compounds in order of toxicity were chlordane, DDT, and toxaphene. Gamma BHC gave a more rapid paralysis than any other compound. An examination of the kill obtained with a wide range of DDT deposits (prepared from water-wettable DDT) proved that a deposit of 25 mgm. per sq. ft. on glass was nearly as effective against the house-fly as a deposit of 200 mgm. per sq. ft. A low percentage kill was achieved only with a deposit of 6.25 mgm. per sq. ft. or less.

The distribution of DDT over the surface made a considerable difference to the kill obtained. A deposit of 25 mgm. per sq. ft. over 100 per cent. of the surface was very much more effective than 100 mgm. per sq. ft. distributed over only 25 per cent. of the surface.

Depletion of the deposit occurred when 10 cages of flies were exposed successively to a deposit of "Deenate" water-wettable DDT or xylene DDT;

on glass. Emulsions of "Velsicol" A.R-60-DDT and H.B-40-DDT on wood again showed depletion, although there was sometimes a secondary formation of crystals after flies had walked over the surface, and in these cases the deposits were more tenacious. Deposits of DDT emulsions containing PD 544-C or xylene were resistant to wear by flies since there was a good initial crystal formation and also a secondary mat of crystals. A solution of 1.62 per cent. DDT in 95 per cent. ethyl alcohol proved to be very toxic when applied to glass. In general small crystals were more toxic and more resistant to wear than others.

The vapours of both gamma BHC and chlordane were highly toxic although gamma BHC vapour was approximately 3 times more so than that of chlordane.

DDT was the most outstanding insecticide for persistence and was followed by DDD, toxaphene, chlordane, and finally gamma BHC. Rain was an important factor in degrading deposits out of doors, and deposits on hard, impervious surfaces such as glass or galvanized iron were more persistent than those on porous surfaces. The greatest degradation of DDT deposits occurred on whitewashed and concrete surfaces. Indoors, on the other hand, DDT emulsions were more persistent on porous surfaces, than on hard surfaces.

Of 8 new insecticides sprayed on wood or glass at 50 mgm. per sq. ft. V_4 (diethyl p-nitrophenyl phosphate) and 497 (dieldrin) were the most persistent.

C. Mary Harrison

DICKE, R. J. & PAUL, J. J. **Space Spray Combinations of Chlorinated Insecticides.** *J. Econom. Entom.* 1951, Dec., v. 44, No. 6, 896-8, 1 fig.

"Mixtures of DDT with chlordane in kerosene solution employed as space sprays demonstrated synergism or enhanced toxicity to houseflies throughout the range of combinations tested. A somewhat lower level of synergism was obtained in combinations of DDT with benzene hexachloride. Synergism was evident for mixtures of DDT with toxaphene or aldrin only when the concentration of the combining insecticide exceeded that of DDT. Antagonism was indicated where the concentration of DDT in a mixture was appreciably in excess of both aldrin and dieldrin. Relatively little or no synergism was demonstrated in combinations of DDT with dieldrin."

HARRISON, C. Mary. **DDT Resistance in an Italian Strain of *Musca domestica* L.** *Bull. Entom. Res.* 1952, Jan., v. 42, Pt. 4, 761-8, 3 figs. [11 refs.]

Two stocks of house-fly were obtained from Italy in 1948: (1) a sample from Torre in Pietra ("TP"), which had shown evidence of DDT-resistance in the field, and (2) some non-resistant flies from Rome ("R"). These were cultured in the laboratory at 26-27°C. for some time, in the absence of DDT, except where stated.

Degree of resistance to DDT was measured (a) by the rate of deposit on a standard (compressed cardboard) surface which would produce 50 per cent. mortality in flies after one hour's exposure; or (b) by the rate of knock-down of the flies inside a glass beaker treated with DDT. The first tests showed that the TP strain was about 3.6 times more resistant to dry deposits of DDT than the R strain. The curve of probit mortality against dose (log. deposit) was flatter with the TP strain, indicating less homogeneity.

On culture in the laboratory, the TP strain lost nearly all its enhanced resistance, by the 22nd generation. It was then selected for resistance to DDT by exposing to filter papers impregnated with 1 mgm./sq. cm. for 1 hour and breeding from survivors. The resistance increased sharply in 5 or 6

generations. After 9 generations this selected sub-colony was compared with the original TP strain by the beaker test. It was observed that resistance to knock-down was much increased and also that the curve of time/knock-down was sharply curved in an abnormal manner. These two characteristics were retained by the sub-colony, without further selection, up to the 22nd generation.

A similar type of selection for resistance to DDT was applied to the non-resistant R strain. After 8 generations, however, there was no appreciable rise of resistance. It is suggested that these facts would be explained if the R strain was pure for non-resistance; the TP strain was heterogeneous (and hence liable to decline to normality) while the selected sub-colony again approached homogeneity for resistance.

Resistance to other insecticides.—The original TP strain was not more resistant than the R strain to γ BHC; it was, however, slightly resistant to pyrethrins.

Some attempt was made to develop a sub-colony of the R strain with resistance to pyrethrins, with some success. By the 7th generation the resistance had increased to 4 times (judged by relative knock-down times); but this declined to 1.9 times in the 8th generation. This pyrethrum-selected sub-colony of the R strain was found to be slightly more resistant than the parent stock to DDT, γ BHC and chlordane. Possibly these increases were due to generally enhanced vigour rather than definite insecticide resistance.

J. R. Busvine

LINDQUIST, A. W., ROTH, A. R., HOFFMAN, R. A. & BUTTS, J. S. **The Distribution of Radioactive DDT in House Flies.** *J. Econom. Entom.* 1951, Dec., v. 44, No. 6, 931-4.

"The distribution of radioactive DDT in various internal organs and external parts of resistant house flies, *Musca domestica* L., was studied. Flies topically treated with 8 to 11.25 micrograms of DDT each showed from 26 to 34 per cent of the total absorbed in the internal organs and the remainder distributed throughout the cuticle.

"Flies exposed to a residual deposit of the DDT showed a similar distribution of the toxicants, but only one-third to one-fourth as much as in the topically treated flies. The prevention of ingestion of the DDT by removal of the proboscises did not appreciably alter the percentage recovery in the different parts.

"In another series of tests it was found that 13 per cent of the total DDT absorbed was present in the body fluids. The intestinal tract, thoracic ganglion, reproductive system, and thoracic muscles of all flies examined showed some radioactivity."

- i. PERRY, A. S. & HOSKINS, W. M. **Synergistic Action with DDT toward Resistant House Flies.** *J. Econom. Entom.* 1951, Dec., v. 44, No. 6, 839-50, 1 chart & 9 figs. [29 refs.]
 - ii. — & —. **Detoxification of DDT as a Factor in the Resistance of House Flies.** *J. Econom. Entom.* 1951, Dec., v. 44, No. 6, 850-57, 1 fig. [11 refs.]
 - iii. FULLMER, O. H. & HOSKINS, W. M. **Effects of DDT upon the Respiration of Susceptible and Resistant House Flies.** *J. Econom. Entom.* 1951, Dec., v. 44, No. 6, 858-70, 12 figs. [14 refs.]
- i. In an earlier paper [*Bulletin of Hygiene*, 1950, v. 25, 1158] the authors claimed that piperonyl cyclonene greatly increased the toxicity of DDT to DDT-resistant house-flies. This has been more fully investigated here and other pyrethrum synergists have been examined for this property.

Measurements of toxicity were made by topical applications of DDT in acetone or turntable spray tests with oil solutions. The two methods gave generally consistent results, though the authors, like BUSVINE [this *Bulletin*, 1952, v. 49, 89] found higher ratios of resistance with the acetone solutions.

Tests were made with susceptible flies and three strains of flies showing different degrees of resistance. Investigation of 8 substances, which are more or less active synergists of pyrethrum, showed that only piperonyl cyclonene had outstanding powers of activating DDT towards resistant flies. It had little or no effect on susceptible flies, except that at high doses it *decreased* the toxicity of DDT by reducing its rate of penetration. At all the doses employed, the piperonyl cyclonene alone caused negligible mortality.

The effects of piperonyl cyclonene in reducing the median lethal concentration of DDT increased with the amount applied; but the increase in efficiency declined asymptotically with all three resistant strains. The maximum reduction in all cases was about 90 per cent. This suggests that some other factor is involved in resistance, which is not influenced by piperonyl cyclonene.

ii. The authors describe their method of estimating DDT and its degradation product DDE (dichlor-diphenyl-dichlorethylene) on the outside and inside of treated flies. They show that, in all cases, surviving flies contained smaller quantities of DDT and more DDE than other flies of a batch which had been killed by the insecticide. The effect of piperonyl cyclonene in all three resistant strains was to suppress this degradation of DDT, to a large extent. Like other investigators, the authors note a greater loss of DDT than can be accounted for by conversion to DDE or by experimental error. They suggest the formation of another unknown metabolite.

Resistant flies are able to survive while containing quantities of DDT lethal to non-resistant ones. Thus, apart from the power of degrading DDT, they are presumably able to store it in a non-vital part of the body.

iii. Measurements of respiration of susceptible flies treated with DDT show increases, corresponding in magnitude and promptness to the dose, followed by a decline to zero at death. The resistant flies do not normally show this response; but if they are rendered more sensitive by the addition of piperonyl cyclonene, they display similar rises of respiration, though the peaks are not so high. That they are capable of the same high rates of respiration is shown by applications of a DDT analogue, 1,1-bis-p-chlorophenyl-2-nitropropane, which cannot be degraded by dehydrohalogenation. This causes equal increase in respiration in both strains.

The increased rates of respiration observed after application of DDT are, of course, a reflection of the continual uncoordinated activity stimulated by that poison. It was noted that the total amount of respiration, until death, was the same in treated and untreated flies at 35°C., which is consistent with the hypothesis that the lethal action of DDT is due to rapid depletion of food reserves owing to the continuous activity caused. At 25°C., however, the oxygen consumed by treated flies before death is less than that of untreated flies.

J. R. Busvine

STERNBURG, J. & KEARNS, C. W. **Degradation of DDT by Resistant and Susceptible Strains of House Flies.** *Ann. Entom. Soc. of America*. 1950, v. 43, No. 3, 444-58.

SUMERFORD, W. T., FAY, R. W., GOETTE, Mary B. & ALLRED, A. Marian. **Promising DDT-Synergist Combinations for the Control of Resistant Flies.** *J. National Malaria Soc.* 1951, Dec., v. 10, No. 4, 345-9. [13 refs.]

Rapid screening tests were made with combined residual deposits of 200 mgm. of DDT and 20 mgm. of test compound per sq. ft. to determine any

synergic action against a strain of house-flies resistant to DDT and other halogenated hydrocarbon insecticides. Altogether, 2,400 compounds were tested and 17 appeared equal or better than 1,1 bis (p chlorophenyl) ethanol (DMC). Eight of the more promising compounds were retested in deposits 4 weeks old with 30-minute exposures of 3-day-old flies, and 24-hour mortality counts were taken. In the deposits used the ratios of DDT to test substance were 10 : 1, 5 : 1, and 1 : 1, based on a DDT content of 200 mgm. per sq. ft. The three best substances in order of effectiveness were p chlorophenyl 1,2 dichloro-2-(p chlorophenyl) ethyl ketone ; 1,1 bis (p chlorophenyl) ethanol ; and 1,1 bis (p chlorophenyl) ethane. The ratio of 1 : 1 was better than 5 : 1 which in turn was far more effective than a ratio of 10 : 1.

The authors suggest that if these three compounds are capable of dehydrohalogenation, dehydration and dehydrogenation in the insect respectively, these reactions may be competing with the detoxification mechanism in which DDT is converted to the non-toxic DDE by the loss of hydrogen chloride.

Further evaluations with different formulations are intended with the 17 more promising compounds.

Thomas E. Fletcher

GERSDORFF, W. A., NELSON, R. H. & MITLIN, N. **The Relative Effect of Several Pyrethrum Synergists in Fly Sprays containing Allethrin.** *J. Econom. Entom.* 1951, Dec., v. 44, No. 6, 921-7.

The effectiveness of three common pyrethrum synergists on the insecticidal action of natural pyrethrins was compared with their effects on allethrin, in "turntable" tests with house-flies. The synergists used were commercial grades of (1) piperonyl butoxide, (2) *n*-propyl isome, and (3) "Synergist 264" (N-octyl bicycloheptene dicarboximide). The allethrin used was of a high grade of purity (94 per cent. by hydrogenolysis method) and, according to a Seil estimation, the pyrethrum extract used contained 54 per cent. of the pyrethrins and cinerins in the "I" form. By the method used, the allethrin alone was about 3 times as toxic as the natural pyrethrins.

Results of three series of tests are given in some detail. From the final analysis it can be seen that when the various synergists are used at 10 times the concentration of the insecticides, the potencies of the different mixtures, relative to pyrethrins alone, are as follows :—

| Synergist | Pyrethrins | Allethrin |
|------------------------------|------------|-----------|
| None | 1 | 2.7 |
| Piperonyl butoxide | 16 | 7.8 |
| <i>n</i> -propyl isome... .. | 7.3 | 6.9 |
| Synergist 264 | 2.1 | 3.9 |

It will be observed that piperonyl butoxide is much more active with pyrethrins than allethrin, so that the mixtures reverse the insecticidal order of these substances. "Synergist 264", however, which is less effective to both, is not able to raise the effectiveness of natural pyrethrins above that of the allethrin mixture.

J. R. Busvine

KERR, R. W. **Adjuvants for Pyrethrins in Fly Sprays. I. The Adjuvant Action of some Essential Oils and other Materials from Australian Plants. II. Adjuvant Activity and Chemical Structure. III. The Mode of Action of Adjuvants.** *Commonwealth Sci. & Indust. Res. Organization, Australia, Bull. No. 261.* 63 pp., 3 pls. [46 refs.] 1951. Melbourne.

Experiments are described in which 27 essential oils and other plant products were tested for synergic effect in pyrethrum sprays. Tests were carried out in a Peet Grady Chamber at 24–26°C., in which 12 ml. of insecticide were atomized at 12.5 lb./sq. in. and each test involved approximately 100 flies. The test spray material consisted of 0.1 per cent. solution of pyrethrins in lighting kerosene and the test materials were incorporated in this at 2 per cent. Ten-minute knock-down, 24-hour mortality counts, showed an increase in mortality and rate of knock-down on the addition of leaf oil of *Backhousia myrtifolia*, wood oil of *Dacrydium franklinii*, leaf oil of *Doryphora sassafras*, wood oil of *Eremophila mitchelli*, leaf oil of *Melaleuca bracteata*, leaf oil of *Zieria smithii*, and Evodionol. All the substances proved to be non-toxic and to act as adjuvants. Chemical analysis showed that one or both of the phenol ethers (elemicin and methyl eugenol), or safrol, was present in most of these substances, and separate tests with each constituent showed these to be responsible for the adjuvant action. *Backhousia myrtifolia* was the most active substance, increasing the kill by 34 per cent. over that of pyrethrins alone in the spray chamber. The oil of *Tagetes glandulifera* merits mention as the only substance tried which had a deleterious effect on the pyrethrins. After aging a few days the mixture was less effective, suggesting that the oil affected the stability of pyrethrins.

Tests with sprays containing compounds closely related to sesamin confirm the view of other workers that the adjuvant action is related to the presence of methylenedioxy groups. Eudesmin, identical with sesamin in nucleus and position of benzene rings, alone showed slight activity. The findings of various workers are reviewed showing that fagaramid contains the methylenedioxy group which is also present in the piperonylamides, and also the *isobutyl* carbamyl group present in IN 930. Compounds related to the piperonylamides but not containing the methylenedioxy group proved to be ineffective as adjuvants. The high activity of "Valone" is confirmed and is compared with the closely related leptosperme which is slightly less effective. Study of 30 phenol ethers showed that a direct relationship exists between the number of methoxyl groups and the presence of adjuvant activity. A methylenedioxy group is ineffective in the absence of a methoxyl group. Allyl side chains showed greater activity than propenyl in these compounds and saturated side chains proved to be ineffective.

An examination of the effects of adjuvants in spray chambers showed that three factors may be present. The addition of materials of low volatility could possibly retard the decrease in droplet size and thus increase pick-up and mortality. Tests with lubricating oil showed this effect to be negligible in tests with house-flies although it has previously been shown to be of importance with mosquitoes. Increase in flight activity and reduction in the rate of knock-down could lead to the acquisition of a larger dose. An individual dosage method showed that the addition of each of the adjuvants leptosperme, elemicin, methyl eugenol, myrsiticin concentrate, Evodionol, wood oil of *Eremophila mitchelli* and leaf oil of *Doryphora sassafras* to pyrethrins indicated that the toxicity of the solution was in fact increased, although the substances were of themselves non-insecticidal. It was supposed that if an adjuvant acted by a physical method it would also have similar action on some other chemical. A series of Peet-Grady tests in which the adjuvants were

added to "Thanite" sprays showed that the rate of knock-down, the activity of the flies and the percentage mortality were not affected. Three observations on the mode of action of adjuvants are given.

1. Adjuvants were not toxic to house-flies at the dosages employed but they increased considerably the toxicity of pyrethrum solutions and showed some degree of specificity for pyrethrins.

2. They increased the activity of flies during exposure.

3. They retarded paralysis of flies caused by pyrethrum.

Ruth Nash

HURLBUT, H. S., ALTMAN, R. M. & NIBLEY, C., Jr. **DDT Resistance in Korean Body Lice.** *Science*. 1952, Jan. 4, 11-12.

To combat lousiness in a large group of Korean troops, 10 per cent. DDT powder was applied weekly throughout the winter and spring of 1951; but nevertheless, infestation steadily increased. By May, the fifth month of routine application, over 34,000 lb. of powder had been used, but examination of samples of men revealed between 35 and 50 per cent. infestation.

Little improvement was obtained in groups of segregated men treated every 3 days or issued with impregnated clothing and blankets. Laboratory tests showed that 24-hour exposure to cloth treated with the 10 per cent. DDT powder only gave partial kills. The DDT powder had been stored for 5 or 6 years before use, but chemical tests showed that it still contained 10.4 per cent. DDT by weight. Furthermore, the lice were abnormally resistant to a fresh sample of 5 per cent. DDT powder, known to be effective to standard laboratory strains of body lice. Thus, of the Korean lice confined in sleeves dusted with this powder (and thus able to feed at will) 41 to 60 per cent. survived 48 hours in two tests, compared with 48 and 62 per cent. in undusted controls.

Earlier American work with normal laboratory lice showed that 100 per cent. kill would be obtained by a 0.25 per cent. DDT powder used in this type of test. In this earlier work, the lice were killed by cloth impregnated with a 0.05 per cent. solution of DDT; but the Korean lice were reared through their complete life cycle on cloth impregnated with 0.1 per cent. solution.

It is concluded that insecticide resistance, of the type shown by the house-fly, may have developed among lice in Korea.

J. R. Busvine

JAUNIN, R. & GERMANO, A. Chloration du cyclohexane. Un nouvel isomère de l'hexachlorocyclohexane. [**A New Isomer of Benzene Hexachloride**] *Helvetica Chimica Acta*. Basle. 1952, Feb. 1, v. 35, No. 1, 392-6.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

JELLIFFE, D. B. **The African Child.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Jan., v. 46, No. 1, 13-41, 6 figs. [Numerous refs.] Discussion 41-6 [SMITH, D.; LEHMANN, H.; HUGHES, M. H.; HODGE, E. H. V.; MESSINEZY, D. A.; STANNUS, H. S.; CHESTERMAN, C. C.; JELLIFFE, D. B. (in reply)].

This paper attempts to give an overall picture of the medical hazards met by African children in their growth to adolescence. Owing to the very diverse ecological conditions it only claims to be an incomplete series of approximations based on the author's experience in the southern Sudan and in Nigeria.

Birth weight varies from 11 to 6½ oz. less than the Caucasian average of 7 lb. but this is due to maternal malnutrition and is not a racial characteristic. Of congenital defects, supernumerary digits, herniae and hydroceles occur most frequently. The possible relationship of various African virus diseases is suggested.

Neonatal tetanus is common and partly seasonal owing to dust from desiccated faeces of goat and hen. Haemoglobinuria from septicaemia has been noted. The "skin type" of umbilicus partly accounts for the high incidence of umbilical hernia. Congenital malaria is rare and of little practical importance and congenital syphilis is mild and evidenced mainly as epiphysitis and a maculo-papular rash; it yields rapidly to penicillin. The rarity of haemolytic disease of the newborn is attributed to the fact that only 5 per cent. of the population are rhesus-negative. Respiratory infections are often epidemic in the rainy season and the habit of forcible feeding with gruel pap causes aspiration pneumonia. Sepsis is more often due to the staphylococcus and the pneumococcus than to the streptococcus. Cases of rheumatic endocarditis do, however, occur. Gastro-enteritis from infected or faulty diet is prevalent and a fulminating variety occurs in infants, with a mortality of 70 per cent., though this might be reduced by parenteral salines with hyaluronidase.

Breast feeding is "on demand" and continues at least partially up to 2 or 3 years of age. Few survive without it and milk apparently remains of remarkably high quality. Women past the menopause can often start lactating as a result of attempts at wet nursing. Special cookery for infants is rarely practised and excess of carbohydrate diet is the rule except among fisher folk. The precise clinical picture of kwashiorkor varies from place to place and depends on the local pattern of vitamin deficiency. Marked fatty change in the liver has been found by biopsy to exist in the first week of life.

Iron deficiency can be seen at all stages of childhood. Plasma proteins remain surprisingly high, however, possibly because of the increase of the globulin immune-bodies stimulated by various infections.

The classical deficiency diseases are rare, but cancrum oris, of which there are good illustrations, is very common in the under-nourished. Passive immunity to malaria probably lasts about 6 months but the "battle for premunition" then begins. Pernicious complications, *e.g.*, sudden onset of coma, are best treated by dilute intravenous quinine injections into the external jugular or a scalp vein. The danger of intramuscular quinine in marasmic infants is stressed.

Neither the drug of choice nor its dosage has been worked out for a malarial prophylaxis which will act as a semi-suppressant and tide infants over the danger period.

Infant mortality (up to 1 year) varies between 300 and 500 and malaria probably accounts for upwards of 14 per cent. of this.

In the child, dental caries is apparently one-tenth as prevalent as in European children. Though partially susceptible to diphtheria between the ages of 1 and 3 years, almost all children have become Schick-negative after 10 years. A similar process of subclinical infection with anterior poliomyelitis, yellow fever and typhoid appears to afford immunity in later life.

Tuberculosis is an increasingly common source of ill-health and death in childhood, and primary pulmonary infections must often be missed in poorly equipped hospitals.

In concluding, the author urges the practice and preaching of preventive paediatrics.

Dr. Dean SMITH stressed the dangers of the 1- to 3-year period, having found in one limited survey three times as many living infants under one year as there were in the second year of life. About 30 per cent. of the infants under

1 year had enlarged livers and he quoted Woodruff's finding of fatty liver change in pregnant Nigerian women. Little was known as to the effect of parasitization on the absorption and utilization of nutrients.

Dr. H. LEHMANN urged the need for the study of electrolytic balance in treating gastro-enteritis and stressed the nefarious influence of parasites especially when nutrition was defective. He was sceptical as to the reported prevalence of sickle-cell haemolysis in the large number of homozygotic carriers in Kenya, whatever may have been the reports from elsewhere.

Dr. HUGHES suggested that fatty livers in newborn infants might be due to partial asphyxia and anoxaemia during birth.

Lt.-Col. E. VERE-HODGE confirmed the existence of rheumatic fever in India as being much more common than was generally realized. Cancrum oris there was generally associated with kala azar and a leucopenia of under 2,000 per cmm.

Dr. D. A. MESSINEZY mentioned that wherever in Greece early exposure to the virus of poliomyelitis was a fact, case incidence in later life was rare. So also with diphtheria.

Dr. C. C. CHESTERMAN stated that instinct and custom seemed to assure balanced diets for pregnant women and infants whenever these were available. It had been stated that *Diphyllobothrium latum* caused megalocytic anaemia by absorbing vitamin B₁₂ from the gut, an example of competitive interests between host and parasite. He still believed that a weekly dose of quinine was a good semi-suppressant for malaria in African children.

Dr. JELLIFFE feared that a lowered infant mortality thus achieved might result in increased malarial mortality later in life. In reply to a question by Dr. Stannus he said that cutaneous diphtheria appeared to be rare in Nigeria; so also was acute rheumatic fever.

C. C. Chesterman

BONILLA-NAAR, A. *Historia de la medicina tropical, parasitología e higiene en Colombia. Referencias bibliográficas (1526-1944).* [**History of Tropical Medicine, Parasitology and Hygiene in Colombia**] 168 pp. 1950. Bogota.

This work consists of a bibliography of over 100 pages in Spanish of references to papers on tropical medicine, parasitology and hygiene in Colombia between 1526-1944. The majority have been written in the last 70 years. The subject matter covers the important diseases of that country and occupies 62 separate sections of the work. In each section the references are given in chronological order, and it is noted that most of them begin with entries dating from the second half of the nineteenth century. At the end of the volume there is an authors index of nearly 40 pages, but while these refer also to the subject, they give the year of publication and not the page of the bibliography on which the entry is to be found.

The introductory pages explain the purpose and scope of the work and the sources of information. From this it is clear that Dr. Bonilla-Naar has devoted an immense amount of time and labour to the compilation, which is a valuable compendium of the medical work and publications in Colombia during the period covered.

H. J. O'D. Burke-Gaffney

JAMES, C. S. **Diseases commonly met with in Melanesia. Their Diagnosis, Prevention and Treatment.** 3rd Edition. 100 pp. [1949] Auckland, N.Z.: Melanesian Mission, Shortland St. (and Whitcombe & Tombs, Ltd., New Zealand & Australia). [7s. 6d.]

BOOK REVIEW

BERGSTERMANN, Heinrich, MENDHEIM, Hans & SCHEID, Gerhard. **Die parasitischen Würmer des Menschen in Europa. Ihre Biologie, Pathologie und Therapie.** [The Parasitic Worms of Man in Europe, their Biology, Pathology and Therapeutic Aspects] pp. viii+199, 35 figs. 1951. Stuttgart : Ferdinand Enke. [DM 23.80.]

The authors of this book, who are members of the staff of the Polyclinic of the University of Munich, state that in this book an attempt has been made to present the whole subject [of helminthic disease] after consideration of the most recent researches. It is primarily written for the physician, but it is also valuable for the veterinary surgeon, the biologist and the farmer. Owing to lack of space, only human helminths found in Europe are dealt with.

The first half of the book is an introduction to the study of helminths for the non-specialist, with separate chapters concerning the biology, epidemiology, the clinical aspects and pathology, diagnostic methods and therapy.

The second half is devoted to the general features of the life-cycle of the helminths, and to a description of the particular parasites. All the parasites which have been recorded as having occurred in man in Europe are listed and described, even those rarities which have been described as having occurred once only. The morphological descriptions are given in detail as might be of interest to the helminthological taxonomist, while the information given on those aspects of transmission which are of importance in the understanding of the epidemiology of each parasite is rudimentary. There is, for example, no explanation of the post-war rise in incidence of *Ascaris* infections in Germany, and the part played by the scattering of the eggs of *Enterobius vermicularis* in dust is but briefly mentioned. The recent rise of incidence of *Cysticercus bovis* in North-Western Europe is not discussed. The description of the epidemiology of *Trichinella spiralis* infections and of hydatid disease are very sketchy.

There are several serious errors of fact. A diagram representing the life-cycle of the trematodes depicts the miracidium developing into the sporocyst, which then may develop into a further sporocyst or into a redia. This second sporocyst is then shown producing cercariae and, surprisingly, a further generation of miracidia, which is shown entering the cycle again at the first sporocyst stage. *Onchocerca volvulus* is described as occurring in cattle, horses, deer and in the dromedary, in addition to man, and it is stated that the diagnosis may be established by finding the microfilariae in the blood ; no mention is made of diagnosis by skin snips.

The book is well produced on art paper, there is a full bibliography and the illustrations, particularly the photomicrographs, are good. It is, however, difficult to understand for whom this book has been written.

W. E. Kershaw

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